



The effect of IT controls on financial reporting

The effect
of IT controls

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Abstract

Purpose – The purpose of this paper is to examine information technology (IT) control deficiencies and their affect on financial reporting.

Design/methodology/approach – This study examines 278 companies reporting IT control deficiencies in the first three years of the SOX 404 requirements (2004-2006). Using quantitative analysis, the study evaluates the impact of IT deficiencies on financial reporting and determines significant differences between companies that report IT deficiencies and companies that do not report IT deficiencies.

Findings – Four accounting errors: revenue recognition issues; receivables, investments and cash issues; inventory, vendor and cost of sales issues; and financial statement, footnote, US GAAP, and segment disclosures issues stand out as common financial reporting problems in companies reporting weak IT controls. This study also suggests that companies with IT control deficiencies report more internal control (IC) deficiencies, are smaller, pay higher audit fees, and are typically audited by smaller accounting firms.

Research limitations/implications – This research is limited in scope since only SOX accelerated filers are included in the analysis. As of this study, smaller, non-accelerated filers are not required to report IC control weaknesses under SOX.

Originality/value – As of this research, no analysis exists to support or refute the relationship of IT controls and accounting errors. This study re-affirms the widespread impact that deficient IT controls can have on the overall IC structure of the business. Our study reveals some of the important issues associated with IT in the financial reporting process. The role of IT in financial reporting systems is destined to escalate. Studies, like ours, can help managers and auditors identify IT problems that affect financial reporting and take remedial steps to correct these weaknesses.

Keywords Legislation, United States of America, Financial reporting, Communications technologies

Paper type Research paper

Introduction

Statement of Auditing Standard (SAS) No. 94 affirms that the nature and character of an entity's use of technology in its information system affects the entity's overall IC structure. However, a minimal amount of information existed prior to the Sarbanes-Oxley Act of 2002 (SOX) to develop an understanding of the impact of IT control deficiencies on financial reporting. Recent management and audit reports filed with the Securities and Exchange Commission (SEC) by accelerated SOX companies now provide a rich body of data to measure this impact. SOX focuses on internal controls, including IT controls, to foster the preparation of reliable financial statements.



Section 404 of SOX requires companies to identify, report, and resolve IC material weaknesses. Thus, IT deficiencies never reported before are now in the spotlight and are targeted for evaluation and improvement.

The purpose of this study is to examine IT control deficiencies and their affect on financial reporting. These IT deficiencies include controls related to software programs, program implementations, segregation of duties associated with access to computer accounting or financial reporting records, and problems with access to electronic data and programs. This paper examines the impact of IT control deficiencies on financial reporting and on the overall corporate-wide IC structure. The focus is on accounting errors described in the annual reports of companies reporting IT control deficiencies from 2004 to 2006. Currently, no available analysis of the data exists to identify the relationship of IT controls and accounting errors.

Results indicate that IC deficiencies and accounting errors occur more often in companies when IT deficiencies exist. Accounting issues dealing with revenue recognition; receivables, investments, and cash; inventory, vendor, and cost of sales; and financial statement, footnote, US GAAP, and segment disclosures issues are more widespread in companies that report IT deficiencies. When compared to companies that do not report IT deficiencies, IT deficient companies pay higher audit fees, while employing smaller audit firms. In addition, companies that report IT deficiencies are smaller, based on revenues, than companies that do not report IT deficiencies.

The first part of this paper discusses SOX legislation and the reporting and auditing requirements of SOX. The second part examines IC and IT implementation guidelines and evaluates auditing guidelines for internal controls. A discussion of the impact of IT on accounting errors and financial reporting follows; the last section describes the methodology and sample used in our study. The paper ends with the results of the study and a conclusion.

SOX and internal control regulations

Beginning in 1977, with the passage of the Foreign Corrupt Practices Act, public companies have been required to maintain adequate internal controls (Turner *et al.*, 2005). Internal controls are processes designed to provide reasonable assurance that management achieves effectiveness and efficiency of operations, reliability of financial reporting, and compliance with applicable laws and regulations (COSO, 1994). Although, internal controls have played a major role in financial reporting for many years, recent accounting scandals at major corporations revealed serious weaknesses in internal controls that inhibited reliable financial reporting. As a result, SOX made internal controls a legislative issue by requiring management to assess and report the effectiveness of the company's internal controls.

Congress implemented SOX to foster the preparation of reliable financial statements. Section 404(a) of the act requires public companies to include in their annual report a statement of management's responsibility for establishing and maintaining adequate internal controls and procedures for financial reporting, along with an assessment of the effectiveness of the company's IC structure (United States Congress, 2002). Section 404(b) requires company auditors to attest to and issue a report on the assessments made by management. In addition, newly issued Auditing Standard (AS) No. 5 (effective for companies with fiscal years ending after November 15, 2007) requires the auditor to provide an independent opinion on the effectiveness of

the company's internal controls over financial reporting (PCAOB, 2007). SOX also requires signing officers to identify any material weaknesses in IC and to report the plans needed to remedy the deficiencies giving cause to the weaknesses. A material weakness is a deficiency, or a combination of deficiencies, of internal controls in financial reporting that gives rise to a reasonable possibility that there is a material misstatement in the company's financial statements. As defined in the Public Company Accounting Oversight Board's (PCAOB) AS5, an IC deficiency occurs when the design or operation of the control does not allow management or employees, in the normal course of performing their assigned functions, to prevent or detect misstatements on a timely basis (PCAOB, 2007). AS5 defines a significant deficiency as "a deficiency, or a combination of deficiencies, in internal control over financial reporting that is less severe than a material weakness, yet important enough to merit the attention by those responsible for oversight of the company's financial reporting." This study focuses specifically on IT related control deficiencies and their affect on financial reporting.

Accounting errors, financial reporting, and internal controls

If the additional SOX requirements for the assessment and reporting of IC exist to improve financial reporting, their provisions indicate a direct relationship between accounting errors and IC deficiencies. If companies improve their IC structures, a related improvement should also exist in the type and total number of accounting errors reported.

The accounting errors for companies in this study follow the definition of an accounting error as reported in Accounting Principles Board Opinion (APB) No. 20 (1971) and in Statement of Financial Accounting Standards (FAS) 154 (2005), which superseded APB No. 20 for years beginning after December 15, 2005. APB No. 20 defines errors as items resulting "from mathematical mistakes, mistakes in the application of accounting principles, or the over-sight or misuse of facts that existed at the time the financial statements were prepared" (paragraph 13). FAS 154 expands this definition to "an error in recognition, measurement, presentation, or disclosure in financial statements resulting from mathematical mistakes, mistakes in the application of GAAP, or oversight or misuse of facts that existed at the time the financial statements were prepared" (paragraph 2(h)). For consistency, we have adopted the more current definition of accounting errors found in FAS 154 for this study.

Iceman and Hillison (1990) examined and identified a functional relationship of accounting errors with internal controls prior to the SOX 404 requirements. Since companies were not required to report IC weaknesses at this time, these authors examined five financial statement accounts of 49 companies for three years by examining the related audit work papers. In every case, the authors found, on average, more accounting errors reported in weak IC systems than in strong IC systems. Their study notes a direct relationship between the reported level of IC and the mean accounting error rate per account.

Studies post-SOX have found similar links between weak internal controls and financial reporting. Ge and McVay (2005) found that material weaknesses in internal controls relate to deficiencies in revenue-recognition, segregation of duties, and period-end reporting, as well as inappropriate account reconciliation. Doyle *et al.* (2007) studied 1,210 firms reporting a material weakness from 2002 to 2005 and found that IC weaknesses, specifically general company-level control weaknesses, are associated

with lower accrual quality. Ashbaugh-Skaife *et al.* (2007) reported similar findings and noted that IC weaknesses lead to unintentional errors that create noise in accruals. Krishnan and Gnanakumar (2007) reported a higher number of financial restatements in companies that reported weaknesses in internal controls. Prior studies examined the characteristics and number of accounting errors and the relationship of internal controls with financial reporting, but few provided empirical support for the relationship between internal controls and specific accounting errors.

Information technology and internal controls

According to the AICPA's SAS No. 3, issued in 1974, the objectives of accounting controls are the same in both a manual system and an IT system. However, the type of data processing used by a company influences the IC methods and objectives (AICPA, 1974). SAS No. 48, which superseded SAS No. 3 in 1984, requires the auditor to consider the processing methods used by the client when planning an audit. Auditors specifically need to evaluate the entity's extent and complexity of computer processing activities (AICPA, 1974). SAS No. 94 adds additional requirements for IT controls and requires the auditor to consider how an entity's use of IT can affect controls relevant to the audit—primarily the use of IT to initiate, record, process, and report transactions or other financial data (AICPA, 2001).

With very little emphasis placed on IT controls, companies prior to SOX incurred limited audits of IT controls. Thus, minimal information exists to develop an understanding of the impact of IT control deficiencies on financial reporting (Canada *et al.*, 2006). However, SOX clearly includes IT controls as a major player in the overall control structural framework of the organization. Companies now adhering to the SOX requirements and the PCAOB auditing standards must disclose significant IT control deficiencies. PCAOB AS5 deals directly with the audit of internal controls and states that the auditor should evaluate the nature and complexity of the systems, including the IT used by the company to process data (PCAOB, 2007). It has become readily apparent that IT governance and controls must align with corporate strategy to achieve reliable financial reporting as required by SOX.

Since IT plays an integral role in a company's internal control system, the presence of IT can either increase or mitigate risks, making IT a very important aspect of effective IC (Canada *et al.*, 2006). In light of the importance of IT governance in the business and compliance environment, IT control procedures have attracted board level attention. Approximately two-thirds of the boards of Fortune 500 companies approve IT strategies (Damianides, 2005). The PCAOB supports this importance in AS5 (paragraphs 24 and 47) by noting that IT general controls could have an effect on the operating effectiveness of other controls and requires auditors to provide an opinion on the effectiveness of internal controls over financial reporting. Although SOX provisions include information on all IC weaknesses, very little information exists to document the significance of the role of IT in reliable financial reporting, leaving IT compliance confusing at most.

The most commonly used guidance for IC governance is the framework of The Committee of Sponsoring Organizations of the Treadway Commission (COSO). However, COSO provides only minimal guidance for the design and implementation of IT internal controls (ITGI, 2006). COSO groups IT control activities into general and application controls. General controls, which apply to all aspects of a computerized

system, help insure proper operations. Application controls include functions within the software application that control the processing of transaction and storage of data. Systems rely heavily on both types of controls to insure reliable and timely financial reporting (COSO, 1994), and both are equally important for SOX assessment of IC.

Since SOX does not provide specific details concerning IT controls, and COSO provides only limited guidance, managers are often plagued with vague requirements for tightening internal controls. Reporting IT weaknesses is a particularly tough area for all industries because guidelines for determining the appropriate level of work are unclear (Blum, 2005; Fisher, 2005). Most managers and auditors have utilized Control Objectives for Information and Related Technology (COBIT) for guidance to evaluate IT controls for SOX compliance (Blum, 2005).

The IT Governance Institute publishes and maintains COBIT to provide businesses a framework to develop effective IT controls. The COBIT framework is based on business processes and centers on four high-level domains of IT controls: planning and organization, acquisition and implementation, delivery and support, and monitoring (ITGI, 2006). COBIT only provides guidance on these high-level control objectives, leaving managers with the responsibility for determining how to best assess the effectiveness of IT controls for the SOX 404 audit. These required assessments are forcing many companies to identify and resolve IT control deficiencies that have never before been reported (Smith, 2004; Wendell, 2005).

Other studies based on actual SOX 404 audit reports identify the impact of IT control deficiencies on financial reporting. Some of the most common IT control deficiencies identified by major audit firms include:

- lack of access controls;
- excessive access to systems and databases;
- improper change management;
- inadequate segregation of duties; and
- lack of a self-assessment process (Tseu, 2005).

Worthen (2005) also identifies similar IT control deficiencies in a top five list as follows:

- (1) failure to segregate duties within applications, and failure;
- (2) to set up new accounts and terminate old ones in a timely manner;
- (3) lack of proper oversight for making application changes;
- (4) inadequate review of audit logs;
- (5) failure to identify abnormal transactions in a timely manner; and
- (6) lack of understanding of key system configurations.

A recent study of the SOX 404 requirements by Li *et al.* (2007) examines the factors that influence IT control quality among companies reporting IT control deficiencies in 2005. Their study reports a direct relationship between the increased quality of IT controls and external factors such as longer tenured CIOs, more IT-experienced managers, higher percentages of independent directors, and more IT-experienced audit committee members. Their study also reveals that clients of Big Four and IT-specialized auditors are less likely to have material IT deficiencies. However, IT control compliance and improved IT quality does come with a significant price. According to

Canada *et al.* (2008), companies with IT control deficiencies are paying significantly higher audit fees compared to companies with either no reported material weaknesses or only non-IT related deficiencies.

As of this research, no analysis exists to support or refute the relationship of IT controls and accounting errors. This research specifically examines the relationship between IT control deficiencies and accounting errors.

Sample and methodology

This study examines 1,394 publicly traded companies, identified by Audit Analytics, which reported at least one IC deficiency during the first three years of the SOX 404 compliance-reporting period, 2004-2006. During this period, SOX 404 required accelerated filers (companies with a market cap greater than \$75 million) to comply. The data are coded to indicate whether companies had a specific deficiency (1) or did not have the deficiency (0). Coded similarly, companies reporting the accounting error have a code of one, while companies that did not report the error have a code of zero. The first part of the study ranks the number of IC deficiencies and accounting errors reported by companies in the sample.

The research then segregates the 1,394 companies into two separate categories. The first category includes 278 companies that reported IT as a type of IC deficiency (IT deficient companies). The second category includes 1,116 companies that did not report IT as an IC deficiency (non-IT deficient companies). Next, this study compares the types of accounting errors most commonly occurring in IT deficient companies with non-IT deficient companies and identifies the ten most common accounting errors reported by the IT deficient companies. The study also utilizes logistic regression to identify any significant differences in the ten accounting errors of the IT and non-IT companies. The study then compares the categories of the ten most common accounting errors found in IT companies with non-IT deficient companies using cross-tab analysis. The next phase examines any significant differences between mean number of IC deficiencies, number of accounting errors, audit fees, non-audit fees, revenues, and types of auditing firms (Big four or non-Big Four) between IT and non-IT deficient companies.

Results

An examination of the IC deficiencies reported in the SOX 404 audit report for each of the 1,394 companies reveals 5,446 reported IC deficiencies, representing an average of 3.9 per company. Table I summarizes the number of IC deficiencies, based on the 21 categories reported in the Audit Analytics database, ranked by the number and percentage of companies reporting the deficiency in this overall population. Over five percent of the total deficiencies reported relate to IT, ranking IT as the sixth most commonly occurring IC deficiency. Appendix 1 provides a description of these IC deficiencies.

Table II provides the 26 types of accounting errors identified by Audit Analytics ranked by the number and percentage of companies reporting the error. The 4,189 accounting errors reported average three errors per company. Appendix 2 describes the types of accounting errors.

Segregating the 1,394 companies into those reporting an IT deficiency and those reporting no IT deficiencies generates 278 IT deficient and 1,116 non-IT deficient companies. Approximately 20 percent of the companies in this population

Internal control deficiencies	Number IC deficiencies reported	Percentage of total reported deficiencies
Accounting documentation policy and/or procedures	1,342	24.64
Material and/or numerous auditor year end adjustments	822	15.09
Accounting personnel resources (competency, training)	678	12.45
Restatement or non-reliance of company filings	653	11.99
Untimely or inadequate account reconciliations	412	7.57
Information technology (software, security, access issues)	278	5.10
Non-routine transactions control issues	267	4.90
Segregation of duties, design of controls	257	4.72
Restatement of previous 404 disclosures	221	4.06
Journal entry control issues	189	3.47
Senior management (competency, tone, and reliability issues)	85	1.56
Ethical or compliance issues with personnel	77	1.41
Scope (disclaimer of opinion or other limitations)	41	0.75
Management, board, or audit committee investigations	38	0.70
Insufficient or non-existent internal audit function	33	0.61
Ineffective or understaffed audit committee	22	0.40
Ineffective regulatory compliance issues	9	0.17
SEC or other regulatory investigations and/or inquiries	7	0.13
Inadequate disclosure controls (timely, accuracy, and complete)	6	0.11
SAB 108 adjustment issues	6	0.11
Remediation from material weakness identified	3	0.06
Total	5,446	100

Table I.
Internal control
deficiencies reported
(*n* = 1,394 companies
reporting 5,446
deficiencies)

reported at least one IT deficiency. Table III summarizes the number of accounting errors occurring most often in IT deficient companies compared to non-IT deficient companies.

In this population, five categories of accounting errors account for approximately 50 percent of the accounting errors reported by companies with IT deficiencies:

- (1) revenue recognition issues;
- (2) receivable, investments and cash issues;
- (3) liability and accrual issues;
- (4) inventory, vendor, and cost of sales issues; and
- (5) property, plant, and equipment issues.

This analysis confirms the top four “account-specific material weaknesses” identified by Ge and McVay (2005) in a prior study of companies reporting material weaknesses from 2002 to 2004.

The logistic regression in Table IV identifies significant relationships between the ten most common accounting errors (identified in Table III) in IT deficient companies

Accounting errors	Number accounting errors reported	Percentage of total accounting errors reported
Tax expense, benefit, deferral, and other FAS109 issues	441	10.53
Revenue recognition issues	416	9.93
Liabilities, payables, reserves and accrual estimate issues	367	8.76
Inventory, vendor, and cost of sales issues	344	8.21
Receivable, investments and cash issues	336	8.02
PPE intangible or fixed asset value issues	268	6.40
Foreign, related party, affiliated and/or subsidiary issues	204	4.87
FAS5 legal contingency commitment issues	182	4.34
Deferred stock based or executive compensation issues	173	4.13
Financial statement, footnote, US GAAP, segment disclosures	167	3.99
Acquisition, merger, disposal or reorganization issues	156	3.72
Lease, leasehold and other FAS13 issues	134	3.20
Depreciation, depletion, or amortization issues	128	3.06
Consolidation and/or foreign currency translation issues	127	3.03
Financial derivatives or hedging (FAS133) issues	121	2.89
Capitalization of expenditures issues	111	2.65
Expense recording issues	93	2.22
Cash flow statement (FAS 95) classification errors	93	2.22
Debt, quasi-debt, warrants, and equity security issues	86	2.05
Intercompany and investment with subsidiary issues	82	1.96
Unspecified, unidentified, inapplicable FASB/GAAP issues	55	1.31
Income statement classification margin and EPS issues	34	0.81
Gain or loss recognition issues	34	0.81
Balance sheet classification of assets issues	18	0.43
Debt and/or equity classification issues	18	0.43
Defective or unreliable accounting reporting records	1	0.02
Total	4,189	100

Table II.
Accounting errors reported ($n = 1,394$ companies reporting 4,189 accounting errors)

compared to non-IT deficient companies. The logistic regression uses IT deficient companies (1) compared to non-IT deficient companies (0) as the dependent variable with the ten most common accounting errors as independent variables. We control for the effect of company's size by including the log of total assets of a company and for audit fees scaled by total fees. We use a dummy variable to control for the type of auditor, Big Four or non-Big Four Firm.

Based on the logistic regression, six of the ten most common accounting errors (variables) have significant relationships with IT deficient companies based on a Wald statistic less than 0.05, and occur more frequently in IT deficient companies that

Categories of accounting errors	Companies reporting IT deficiencies (N = 278)		Companies reporting no IT deficiencies (N = 1,116)	
	Number of accounting errors	Percent of accounting errors	Number of accounting errors	Percent of accounting errors
Revenue recognition issues	157	12.03	259	8.98
Receivable, investments and M				
cash issues	134	10.27	202	7.00
Liabilities, payables, reserves, and accruals	128	9.81	239	8.29
Inventory, vendor, and cost of sale issues	126	9.66	218	7.56
PPE, intangible, or fixed asset value issues	91	6.97	177	6.14
Tax expense, benefit, deferral, other FAS 109	89	6.82	352	12.21
Foreign, related party, affiliate,				
and subsidiary	70	5.36	134	4.65
Financial stmt., footnote, GAAP segment disclosure	64	4.90	103	3.57
FAS5, legal contingency commitment	49	3.75	133	4.61
Consolidation, Fin46, foreign currency translation	47	3.60	80	2.77
Acquisition, merger, disposal, or reorganization	40	3.07	116	4.02
Capitalization of expenditures issues	40	3.07	71	2.46
Expense recording issues	40	3.07	53	1.84
Deferred stock based or executive comp issues	35	2.68	138	4.79

(continued)

Table III.
Most common accounting errors in IT deficient companies compared to non-IT companies

Table III.

Categories of accounting errors	Companies reporting IT deficiencies ($N = 278$)		Companies reporting no IT deficiencies ($N = 1,116$)	
	Number of accounting errors	Percent of accounting errors	Number of accounting errors	Percent of accounting errors
Depreciation, depletion, or amortization issues	30	2.30	98	3.40
Inter-company investment subsidiary issues	30	2.30	52	1.80
Leasehold and other FAS13 issues	30	2.30	104	3.61
Debt, quasi-debt, warrants, equity security	25	1.92	61	2.12
Financial derivatives or hedging (FAS133)	24	1.84	97	3.36
Unspecified, unidentified, inapplicable FASB/GAAP	18	1.38	37	1.28
Cash flow statement (FAS95) classification errors	12	0.92	81	2.81
Income statement classification				
margin and EPS	8	0.61	26	0.90
Balance sheet classification of assets	7	0.54	11	0.38
Gain or loss recognition	6	0.46	28	0.97
Debt and/or equity classification issues	4	0.31	14	0.49
Defective or unreliable reporting records	1	0.08	0	0.00
Total	1,305	100	2,884	100

Notes: Statistical analysis of the ten most commonly reported accounting errors using the logistic regression indicates significance at the less than 0.001 level (***) and 0.05 level (*) for six of the top-ten accounting errors. Table IV for the logistic regression summary of the ten most common accounting errors

Top ten accounting errors for companies with IT deficiencies	Expected sign	<i>B</i>	Exp (<i>B</i>)	SE	Wald	Significant
Revenue recognition issues	+	0.9733	2.6465	0.1855	27.5293	0.0000
Receivable, investments, and cash issues	+	0.7084	2.0307	0.1898	13.9368	0.0002
Liabilities, payables, reserves, and accruals	+	0.4356	1.5459	0.1855	5.5150	0.0189
Inventory, vendor, and cost of sale issues	+	0.6212	1.8611	0.1827	11.5555	0.0007
PPE, intangible, or fixed asset value issues	+	0.4821	1.6195	0.1996	5.8337	0.0157
Tax expense, benefit, deferral, other FAS 109	-	-0.0531	0.9483	0.1868	0.0807	0.7763
Foreign, related party, affiliate, and subsidiary	+	0.1758	1.1922	0.2206	0.6352	0.4254
Financial stmt., footnote, GAAP segment disclosure	+	0.7224	2.0594	0.2204	10.7426	0.0010
FAS5, legal contingency commitment	+	0.4806	1.6170	0.2506	3.6773	0.0552
Consolidation, Fin46, foreign currency translation	+	0.4911	1.6341	0.2675	3.3720	0.0663
Big four	-	-1.5436	0.2136	0.2024	58.1729	0.0000
Size	-	0.0398	1.0406	0.1162	0.1174	0.7318
Audit fees	+	1.0200	2.7733	0.5899	2.9901	0.0838
Constant		-2.8899	0.0556	1.1310	6.5291	0.0106

Table IV.
Ten most common accounting errors in IT deficient companies logistic regression* for the probability of IT control deficiencies

Notes: *The logistic regression reveals the odds of reporting IT deficiencies if the statistically significant accounting error occurs. For example, the odds of a company reporting an IT deficiency are 2.6 times (Exp(*B*)) the odds of not reporting an IT deficiency for a company reporting revenue recognition as an accounting error in this model

non-IT deficient companies. The asterisk notation in Table III identifies these six accounting errors. Four of the six accounting errors:

- (1) revenue recognition;
- (2) receivables, investments and cash issues;
- (3) inventory, vendor, and cost of sale issues;
- (4) financial statement, footnote, US GAAP, and segment disclosures issues are significant at the 0.001 level. The remaining two accounting errors;
- (5) liabilities, payables, reserves, and accruals; and
- (6) PPE, intangible or fixed asset value issues are significant at the 0.05 level. The overall model is significant at the less than 0.001 level with a Nagelkerke R^2 statistic of 0.287.

The Hosmer-Lemeshow statistic of not less than 0.05 indicates that the model adequately fits the data.

The result may be due to the extent of sophistication in enterprise systems. The six accounting errors noted in the above analysis relate to common transaction accounts that include functions common to core modules in an enterprise system such as the routine recording of sales, receivables, payables, and assets. IT internal controls play a

larger role in the accuracy of these specific accounts since they are highly automated. The four accounting issues not found to be significantly different between IT companies and non-IT companies may not be transaction based. Complex issues, such as tax expense, are often calculated outside the centralized enterprise system utilizing end-user computing methods, most notably spreadsheet applications (Compassoft, 2007). Contingency commitments require human judgment with decisions based on the probability of the contingent outcome and are most likely not programmed into the existing enterprise system. Often consolidation procedures with subsidiaries are not automated in a single system since many divisions and subsidiaries rely on legacy systems (Brown and Nasuti, 2005). In such cases, manual adjusting entries may be necessary to perform the consolidation. ICs other than IT may be more predominate in these four accounting errors. The results, once again, emphasize the negative impact ineffective IT controls have on financial reporting and identify the specific types of errors most likely to occur in companies with IT deficiencies.

The cross-tab analysis in Table V reveals nine of the ten most common errors to be significantly different between IT deficient and non-IT deficient companies, compared to six of ten errors in the logistic regression analysis. The cross tab analysis reaffirms the strong significant relationships with four common types of accounting determined by the regression analysis:

- (1) revenue recognition issues;
- (2) receivables, investments, and cash issues;
- (3) inventory, vendor, and cost of sales issues; and
- (4) financial statement, footnote, US GAAP, and segment disclosures issues.

To eliminate some of the noise in the above analysis and attempt to isolate IT deficient companies, an experimental two-step cluster analysis grouped the sample companies based on their IC deficiencies. The results show definite patterns in the IC deficiencies and types of accounting errors of companies in each separate cluster and reveal results similar to the regression and cross-tab analyses.[1]

Table VI compares specific characteristics of IT and non-IT deficient companies. IT deficient companies reported significantly more IC deficiencies than non-IT deficient companies as well as significantly more accounting errors than non-IT deficient companies. These findings support results reported by Icerman and Hillison (1990) where the average number of accounting errors was greater in weak IC systems than in strong systems. However, the findings in this study confirm this relationship specifically with weak IT controls. The relationships identified in this study signify the importance of strong IT controls and the impact of ineffective IT controls on financial reporting. These findings also confirm the importance of IT controls on the impact of the overall IC structure of a company as noted by SAS No. 94.

Comparisons in Table VI also reveal that companies with IT deficiencies are significantly smaller, based on revenues, than companies without IT deficiencies. IT deficient companies report mean revenues of \$1.64 million while non-IT deficient companies report mean revenues of \$3.17 million. Even though companies reporting IT deficiencies may be smaller, they pay significantly higher audit fees than companies reporting no IT deficiencies. These higher audit fees are not necessarily attributable to the size of the company's auditing firm. IT deficient companies were audited less often

Accounting errors	Companies reporting IT IC deficiencies N = 278		Companies not reporting IT IC deficiencies N = 1,116		φ coefficient Approx. Sig.
	Number of companies reporting errors	Percent of companies reporting errors (percent)	Number of companies reporting errors	Percent of companies reporting errors (percent)	
Revenue recognition issues	157	56.5	259	23.2	0.291 0.000
Receivable, investments, and cash issues	134	48.2	202	18.1	0.281 0.000
Liabilities, payables, reserves, and accruals	128	46.0	239	21.4	0.223 0.000
Inventory, vendor, and cost of estimate issues	126	45.3	218	19.5	0.239 0.000
PPE intangible or fixed asset	91	32.7	177	15.9	0.171 0.000
value issues					
Tax expense, benefit, deferral, and other FAS109 issues	89	32.0	352	31.5	0.004 0.879
Foreign, related party, affiliate, and/or subsidiary issues	70	25.2	134	12.0	0.149 0.000
Financial statement, footnote, US GAAP, segment disclosures	64	23.0	103	9.2	0.170 0.000
FAS5 legal contingency commitment	49	17.6	133	11.9	0.068 0.011
Consolidation and/or foreign currency translation issues	47	16.9	80	7.2	0.135 0.000

Table V.
Cross-tab comparisons of
ten most common
accounting errors
between IT and non-IT
deficient companies for
years ended 2004-2006

Table VI.
Comparison of
characteristics of IT
deficient and non-IT
deficient companies

<i>Characteristics</i>	Companies reporting IT IC deficiencies <i>N</i> = 278		Companies not reporting IT IC deficiencies <i>N</i> = 1,116		<i>T</i> -test for equality of means		
	Mean	SD	Mean	SD	Mean diff.	<i>T</i> -value	<i>P</i> -value
Number of IC deficiencies	5.12	2.412	3.36	1.457	1.763	11.670	0.000
Number of accounting errors	4.69	3.268	2.58	1.869	2.11	10.351	0.000
Audit fees (in millions)	\$5.50	16.395	\$3.30	8.335	\$2.20	2.224	0.027
Non audit fees (in millions)	\$4.80	12.607	\$7.10	1.261	\$-2.30	-1.392	0.164
Revenues (in millions)	\$1.64	5.837	\$3.17	16.467	\$-1.53	-2.413	0.016
Audited by big four	59	0.493	80	0.400	-19	-6.713	0.000

by Big Four auditing firms. Only 59 percent of the IT deficient companies in this population were audited by Big Four firms compared to 80 percent of the non-IT deficient companies. This implies that companies with IT deficiencies pay more for audits, even though they have a tendency to hire smaller firms. These findings confirm previous studies where the hours and fees increased for IT audit assessments (Daigle *et al.*, 2005) along with increases in the overall audit fees of companies with significant IT deficiencies (Canada *et al.*, 2006).

Summary and conclusion

IT governance plays a vital role in financial reporting. This study reveals that approximately 20 percent of accelerated filers reporting at least one control deficiency in the first three years of the SOX 404 compliance period reported IT control deficiencies. Evidence from this study suggests that companies with IT control deficiencies report significantly more IC deficiencies (other than IT) than non-IT companies. This re-affirms the widespread impact that deficient IT controls can have on the overall IC structure of the business.

Six of the ten most commonly occurring accounting errors identified in this study occur significantly more often in IT deficient companies than non-IT deficient companies. These six accounting errors involved accounts with a high-level of transaction-based activity common to enterprise systems. Most IT controls are associated with input and processes in an automated system and may account for IT controls being weak in these specific areas.

Additional analysis confirms the high significance (at the 0.001 level) of four specific accounting errors:

- (1) revenue recognition;
- (2) receivables, investments, and cash issues;
- (3) inventory, vendor, and cost of sales issues; and
- (4) financial statement, footnote, US GAAP, and segment disclosures issues.

These results also confirm the negative impact that IT deficiencies can have upon specific types of accounting errors in the financial reporting process.

This analysis also reveals specific characteristics of IT deficient companies. Companies with IT deficiencies report significantly more accounting errors than companies not reporting IT control deficiencies. In addition, companies with IT deficiencies pay higher audit fees even though the IT deficient companies tend to be smaller (based on total revenues). IT deficient companies pay higher fees while most employ smaller auditing firms (other than Big Four) than companies without IT deficiencies. It is evident that smaller companies pay a higher price for poor IT controls monetarily as well as through the cost of poor financial reporting.

As with any research design, there are inherent limitations in our study. Our study primarily consists of accelerated filers for SOX compliance. Inclusion of the smaller companies, non-accelerated filers, in this study may have produced different results. Our research focuses on companies that reported IT deficiencies and the impact of these IT deficiencies on financial reporting. An analysis of IC deficiencies other than IT may have provided similar, or different, results.

We have studied companies that reported IT deficiencies in the first three years of SOX compliance. Further research is needed to determine if companies that continue to report IT deficiencies in subsequent years support our results. In addition, more detailed analysis of the specific IT deficiencies and their relationship to financial reporting is needed. Future research can expand this study to analyze other types of IC deficiencies that may result in accounting errors that impact the overall poor quality of financial reporting.

This study demonstrates the impact IT control deficiencies can have on financial reporting and reveals some of the important issues associated with IT in the financial reporting process. Managers must continue to evaluate the impact of IT on their overall system of internal controls. Auditors must stay abreast of IT developments and weigh the risk IT places on financial reporting. As technology evolves and new systems develop, the role of IT in financial reporting systems is destined to escalate. Studies, like ours, can help managers and auditors identify IT problems that affect financial reporting and take remedial steps to correct these weaknesses.

Note

1. Results of the sensitivity analysis are not reported and are available upon request.

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Appendix 1. Internal control deficiencies identified by audit analytics

- *Accounting documentation, policy and/or procedures*—Represents internal control systems that do not contain adequate documentation, policies or other means of justifying account balances. May also include failure of controls that ensure accounts are recorded based on GAAP, SAB, and FASB. May also include failures in policies or procedures designed to gather information on a timely basis or problems with the y/e close process.
- *Accounting personnel resources*—Consists of problems with accounting personnel resources, competency, training, experience, and/or adequacy.
- *Ethical or compliance issues with personnel*—Consists of problems with personnel in the areas of compliance with policies, maintenance of ethical standards, fraud and intentional acts that lead to (or could lead to) misstated account balances or financial reports.
- *Inadequate disclosure controls (timely, accuracy, and complete)*—Represents deficiencies related to the adequacy of information flow that should result in a required disclosure.
- *Ineffective or understaffed audit committee*—Circumstances where an audit committee may not have the personnel, expert, experience, and/or resources to perform their duties.
- *Ineffective regulatory compliance issues*—Deficiencies associated with failures to meet regulatory requirements other than taxes.
- *Information technology*—Deficiencies include deficient program controls, software programs or implementation, segregation of duties associated with access to computer accounting or financial reporting records and problems with access to electronic data and/or programs.
- *Insufficient or non-existent internal audit function*—Circumstances where a company's internal audit function was insufficient in identifying and/or advising in the correction of internal control deficiencies. It also identifies a failure to have an internal audit department at all.
- *Management, Board, or Audit Committee investigations*—Consists of internal investigations underway relative to accounting and/or financial reporting matters.
- *Material and/or numerous auditor year-end adjustments*—Circumstances where the material weakness was the due to the number and/or size of year-end adjustments including auditor adjustments. These adjustments also consider footnote.
- *Remediation of material weakness identified*—Refers to disclosures that indicate that material weakness and/or internal control deficiencies have been remediated.
- *Restatement of previous 404 disclosures*—Circumstances where a company restated its 404 opinion because of some event (a restatement of financials) that occurred subsequently to filing.
- *Scope (disclaimer of opinion or other limitations)*—The company had not completed its own review of internal controls and therefore could not be audited.
- *SEC or other regulatory investigations and/or inquiries*—Circumstances where an SEC investigation or inquiry is underway.
- *Segregations of duties, design of controls*—Deficiencies with the design and use of personnel within an organization. Primarily deals with segregation of duties.
- *Senior management (competency, tone, and reliability issues)*—Identifies circumstances where internal control weaknesses are attributed directly to potentially improper or negligent conduct of the current or former senior management of the company.
- *Untimely or inadequate account reconciliations*—This category identifies inadequate account reconciliations as the reason for material or numerous adjustments.

Appendix 2. Categories of accounting errors identified by audit analytics

- *Acquisition, merger, disposal or reorganization issues*—Issues associated with the merger, acquisitions, reorganization, or disposal and vary from incorrect application of GAAP to the proper intangible assets levels associated with acquisitions, as well as failure to record the proper reserves for disposal or reorganization.
- *Balance sheet classification of asset issues*—Issues associated with how assets were classified on the balance sheet. Primary errors include misclassified assets as short-versus long-term or whether certain assets are properly considered cash equivalents versus short-term investments.
- *Capitalization of expenditures issues*—Issues in the capitalization of expenditures. These can include expenditures for inventory, construction, intangible asset, R&D, software or product development, and other purposes.
- *Cash flow statement (FAS 95) classification*—Errors in cash flow statements (FAS 95) that are not consistent with GAAP typically occurring with non-routine transactions.
- *Consolidation and/or foreign currency translation*—Issues associated with the consolidation of subsidiaries including variable interest entities and off balance sheet arrangements. This category also identifies issues associated with foreign currency translations, minority interests, and eliminations.
- *Debt, quasi-debt, warrants, and equity security issues*—Issues associated with the recording of financing/bank/securities debt or equity section accounts. Errors in this area often arise because of incorrect recording of beneficial conversion features in debt/quasi debt or equity securities. They also occur with the calculation of premiums/discounts on debt securities or the proper valuation of certain non-traded equity securities.
- *Debt and/or equity classification issues*—Issues in the proper classification of debt instruments as short term or long term. This area can also refer to reclassifications between equity and debt accounts or within equity accounts.
- *Defective or unreliable accounting and reporting records*—Disclosures by a registrant that a scope limitation exists with respect to the company's ability to rely on accounting records. Typically, no restatement is announced because the amount, if any, cannot be determined.
- *Deferred, stock-based, or executive compensation issues*—Associated with recording deferred or executive compensation associated with the valuation of options or similar derivative securities and their recording on the books. This category also includes other forms of errors associated with executive compensation arrangements.
- *Depreciation, depletion or amortization issues*—Associated with depreciation of assets, amortization of assets and/or amortization of debt premiums or discounts. This category can also include deficiencies associated with depletion of reserves or amortization of other fixed assets.
- *Expense recording issues*—Associated with the expensing of assets or understatement of liabilities. These issues can arise from failure to record certain expenses, write off certain assets or acknowledge certain liabilities. This category also includes miscellaneous occurrences of expensible items including payroll and SG&A issues.
- *FAS 5, legal, contingency, and commitment issues*—Associated with FAS 5 type contingencies and commitments and also deals with issues associated with the disclosure or accrual of legal exposures and issues associated leases and lease commitments. One significant area is the proper accounting or determination of operating vs capitalized leases.

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- *Financial statement, footnote, US GAAP, segment disclosure issues*—Related to preparation of FS and footnotes, including conversion of foreign company financial statements to US SEC/US GAAP/FASB Standards, segment recording and related annual report disclosures.
 - *Financial derivatives or hedging (FAS 133) issues*—Related to derivative instruments, including valuation of financial instruments such as hedges on currency swings, interest rate swaps, purchases of foreign goods, guarantees, and other.
 - *Foreign, related party, affiliated, and/or subsidiary issues*—Associated with disclosures about related, alliance, affiliated and/or subsidiary entities. Also refers to issues at foreign subsidiaries.
 - *Gain or loss recognition issues*—Issues in recording gains or losses from the sales of assets, interests, entities or liabilities. Errors often result from calculating the proper basis for disposing of an asset or the proper amount to record as sales revenue and normally relate to issues associated with non-routine or significant transactions.
 - *Income statement classification, margin and EPS issues*—Associated with disclosure of financial/operational ratios or margins and earnings per share calculation. Also included are misclassification of items on the income statement between gross margin and selling general and administrative expenses. This may also include issues associated with exceptional items.
 - *Intercompany and investment with subsidiary issues*—Related to intercompany or affiliate balances, investment valuations or transactions and problems that arise when intercompany balances are not reconciled and accounted for on a timely basis.
 - *Inventory, vendor and cost of sales issues*—Associated with transactions affecting inventory, vendor relationships (including rebates), and/or cost of sales.
 - *Lease, leasehold, and other FAS 13 issues*—These errors occurs when a lease, leasehold or related issue has been identified representing a subcategory of the Lease, FAS 5 category.
 - *Liabilities, payables, reserves, and accrual estimate issues*—Issues associated with the accrual or identification of liabilities on the balance sheet. These range from failures to record pension obligations to problems with establishing the correct amount of payables, accruals or other reserves. Issues in this area most often occur because of cut-off failures in recording liabilities and matching them to related revenue or inventory accounts.
 - *PPE, intangible, or fixed asset issues*—Issues in the recording of PPE, fixed, intangible, goodwill, or long term assets. It also applies to contra liabilities, long-term development projects and goodwill associated with acquisitions.
 - *Receivable, investments, and cash issues*—Issues with respect to cash, cash equivalents, accounts receivable, short-term investments, certain long-term investments, notes, loans collectible, allowance for uncollectibles, notes receivables, and/or related reserves.
 - *Revenue recognition issues*—Associated with recognition of revenue originating from a failure to properly interpret sales contracts for hidden rebates, returns, barter or resale arrangements. They also occur because of misapplied credits or debits associated with customer accounts.
 - *Tax expense, benefit, deferral, and other FAS 109 issues*—Issues associated with various forms of tax obligations or benefits mostly relate to foreign tax, local taxes, or tax planning issues. Some deal with failures associated with sales taxes, etc. The accounts impacted can include expense, deferral or allowances.

- *Unspecified, unidentified, inapplicable FASB/GAAP issues*—Identifies when the 404 or 302 disclosures are lacking in sufficient information to identify what accounts or areas of financial reporting are being impacted by disclosure controls deficiencies. It may also indicate that a GAAP/FASB effect is not applicable.

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