Examination of Earnings and Cash Flows as Indicators of Fraud

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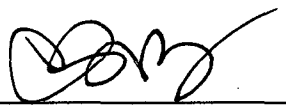

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ABSTRACT

Auditors, accountants, financial analysts, regulators, and others need financial statements to be free of material misstatement. Financial statement fraud in the United States is estimated to average $100 billion per year. This research was to examine the extent to which analysis of the ratio of (a) cash flows from operating activities to (b) earnings from continuing operations might be used to detect financial reporting fraud. Data were drawn from financial reports of firms registered with the Securities and Exchange Commission (SEC). A quantitative quasi-experimental design, including control data without detected financial reporting fraud and treatment data with reporting fraud was used to (a) establish the relationship between cash flows from operating activities and earnings from continuing operations by computing Pearson's *r* across the samples; (b) compare means of the cash ratios, with and without fraud, with *t*-tests; and (c) compare the means from the cash ratios before and after detection of fraudulent reporting, with *t*-tests. Data used were secondary and publicly available. Correlation between the components of cash ratios in the aggregated samples was high ($r(1361) = .947$); low for fraud samples before restatement ($r(592) = .444$) and moderate for the fraud group after restatement ($r(343) = .645$). The *t*-tests (two-tailed, unequal variances) at the .05 level of significance showed the means of the cash ratios were not significantly different: (a) with and without fraud, $t(801) = 1.21$, $p = .225$; (b) before and after fraud, $t(933) = .208$, $p = .836$; and (c) with matched pairs before and after fraud, $t(178) = 1.43$, $p = .153$. Reasons cash ratios did not demonstrate significant differences include: (a) fraudulent data in

the control group, (b) non-fraud data in the fraud group, and (c) fraudulent data in the fraud group. Cash ratios for fraud firms were not significantly different from non-fraud firms. Financial statement users now have a technique available to alert them to possible financial statement reporting fraud. Further research may include determining if the coefficients of correlation for the sample groups are statistically different, whether control of effect size may enhance significance, and whether firm size is significant.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1: INTRODUCTION

Auditors, accountants, financial analysts, regulators, and other users of financial statements need these statements to be free of material misstatement, whether caused by error or fraud (Financial Accounting Standards Board, 1978), and therefore are interested in identifying fraudulent financial reporting. Users of financial statements assume (a) that cash flows from operating activities track reported earnings from continuing operations, and (b) that discrepancies should raise red flags for auditors (Albrecht, Albrecht, & Albrecht, 2006; Wells, 2001). Because operating activity cash flows are often assumed to follow earnings from continuing operations, given no other apparent explanation, it should follow that discrepancies in the relationship of cash flow from operating activities to earnings from continuing operations should indicate fraud or error in the financial reports, but the signal is not strong. Researchers in academia have developed models to help detect fraudulent financial reporting (Dechow, Sloan, & Sweeney, 1995), but the models offer only weak indications of the possibility of reporting fraud, and offer limited assurance to users of financial statements who cannot easily develop information to confirm or deny the indications.

Chapter 1 is organized into 10 sections. These include (a) a background section to discuss why the topic is of interest; (b) a problem statement indicating the need for the study; (c) a statement of purpose to show the intent of the study; (d) a brief theoretical framework discussion of how this study fits into the overall conceptual research of the subject matter; (e) a statement of the research questions for the study; (f) the hypotheses propounded for the study; (g) a short

introduction to the nature of the study, its design, and constructs; (h) a statement of the significance of the study and its expected contribution to the field; (i) definitions of key terms unique to the study; and (j) a short summary.

Background

The Securities Act of 1933, which created the Securities and Exchange Commission and is known as the truth in securities act, was intended to ensure the public was provided the financial information needed to invest in securities and to eliminate misrepresentation and deceit in the sale of securities, in the financial statements, and other information provided (Securities and Exchange Commission, 2009b). In 2002, Congress enacted the Sarbanes-Oxley Act. This law, also known as the Public Company Accounting Reform and Investor Protection Act, was to provide reforms to increase corporate responsibility, enhance financial disclosures, and combat corporate and accounting fraud. These objectives were essentially the same objectives as the Securities Act of 1933. Dittmar and Bishop (2008) cited evidence from the Securities and Exchange Commission's Accounting and Auditing Enforcement Releases (AAERs) indicating about 50 incidents describing financial statement frauds per year for the years from 2004 through 2008, versus an average of about 30 per year for the years 2000 through 2001. These AAERs represented about 223 financial statement fraud schemes per year for the 2004-2008 periods, compared to about 86 fraud schemes per year for the pre Sarbanes-Oxley period.

Problem Statement

Auditors, regulators, investors, and other users of financial statements face the problem of detection of financial statement reporting fraud. Financial statement fraud is a problem in the United States (Albrecht et al., 2006; Sessions, 1990; Wells, 1997). Occupational fraud losses in the United States may be as much as $994 billion per year, and financial statement reporting fraud may average as much as $100 billion per year (Association of Certified Fraud Examiners, 2008). The Securities and Exchange Commission (2003c) was required by Section 704 of the Sarbanes-Oxley Act of 2002 to report to Congress on enforcement actions for the 5 years prior to enactment. The content of the report was to include a study of enforcement actions identifying financial reporting areas susceptible to fraud, manipulation, and improper earnings management. The study covered 515 enforcement actions filed between July 31, 1997, and July 30, 2002, based on 227 investigations. The Securities and Exchange Commission reported that 126 of the 227 enforcement actions involved financial reporting fraud including fictitious sales reporting, improper timing of recognition of revenue, and revenue valued improperly. Fictitious revenue was involved in 80 of these cases. Senior management was involved in at least 104 of these 126 cases.

A gap exists in the literature of the detection of fraudulent financial reporting about the ratios of cash flows from operating activities to earnings from continuing operations before and after, and with and without, fraudulent financial reporting. Dechow, Sloan, and Sweeney (1995) evaluated five models for

disaggregating earnings into the component cash flows plus normal accruals plus discretionary accruals. These researchers found the models returned only low levels of confidence for rejection of the null hypotheses denying earnings management at magnitudes of manipulation judged plausible, but the models' null hypotheses of no earnings management were rejected when the samples included firms with extreme financial performance from high levels of discretionary accruals. Beneish (1999) designed and tested a multi variant model specifically for the detection of earnings management that also was evaluated as showing a low level of confidence when rejecting the null hypothesis of no earnings management. The Lee, Howard, and Ingram (1999) model for the detection of earnings management was designed to examine the relationship of cash flows to earnings, but it focused on the magnitude of the difference between cash flows and earnings.

Purpose

The three-fold purpose of this quantitative study was to determine the extent, if any,

1. That there was a correlation between (a) current period cash flows from operating activities and (b) current period earnings from continuing operations.
2. That the ratio between (a) cash flows from operating activities and (b) earnings from continuing operations (the cash flow ratio) was different for firms with detected financial reporting fraud compared to firms without detected financial reporting fraud.

3. That there was a change in the cash flow ratios for fraud firms before and after the identification of fraudulent financial reporting.

The main research variable was the cash flow ratio. This dependent variable was chosen for the focus of the research in part because of its simplicity, as a simple measure may become a more practical tool for stakeholder users of financial statements. The cash flow ratio is a construct representing the ratios of cash flows from operating activities to earnings from continuing operations.

The sample of fraud firms was drawn from a database prepared by the United States Government Accountability Office (GAO) as part of a report to congress mandated by the Sarbanes-Oxley Act of 2002 (Agostino, 2003). The database is a series of three reports in the form of letters to the appropriate Congressional committees, from the GAO. This material was not published by the Government Printing Office but has been available on the GAO website. It covers firms that restated their financial reports for the prescribed years, which are within the jurisdiction of the Securities and Exchange Commission. Calculated minimum sample sizes for the means comparisons, given the finite population of firms in the GAO database of 2,309, and controlling the smallest effect size by setting Cohen's *d* to .2 limited the sample size necessary for the comparison of independent means tests to 812 test units in two samples of 475 and 337 units (Faul, Erdfelder, Lang, & Buchner, 2007; Hopkins, 2008; Kelley, 2005). The level of significance was set at .05, and the desired power of the tests was set at an 80% probability (*beta* set at .2) of identifying fraud/restatement without a Type II error.

Because of the frauds at WorldCom, Enron, and others, the problem of financial statement fraud has been highlighted in the public view, as seen by the response of the United States Congress' enactment the Sarbanes-Oxley Act ("Public Company Accounting Reform and Investor Protection Act," 2002). Auditors often make Type I errors in which they render a clean audit opinion—an opinion stated without qualification for any deficiency from the reporting standard—for financial statements that do not conform in all material respects to U.S. generally accepted accounting principles because of financial statement fraud perpetrated by management (Albrecht et al., 2006; Arens, Elder, & Beasley, 2005; Knapp, 2006). Financial analysts and others depend on the availability of financial reports that are reliable and relevant for their purposes (Financial Accounting Standards Board, 1978), meaning free of material misstatement, whether caused by error or fraud.

The gap that existed in the literature of the detection of fraudulent financial reporting concerned the specificity of the ratios of cash flows from operating activities to earnings from continuing operations both before and after, and with and without fraudulent financial reporting. At least two categories of research in the literature of financial reporting fraud detection are observable. In the literature of the practitioner there is a general assumption that cash flows from operating activities track reported earnings from continuing operations and that discrepancies should always raise red flags for auditors, investors, regulators, and other users of financial statements (Albrecht et al., 2006; American Institute of Certified Public Accountants, 2002; Wells, 1997).

The gap in the research literature that was to be filled by the research was about the specificity of the ratios of cash flows from operating activities to earnings from continuing operations before and after, and with and without, fraudulent financial reporting. The gap was about the ratio of cash flows to earnings, rather than the size of the difference in cash flows and earnings as researched by Lee et al. (1999). The gap in the literature also was not about red flags as discussed in the practitioner and authoritative literature such as Statement on Auditing Standards (SAS) 99, Consideration of Fraud in a Financial Statement Audit (American Institute of Certified Public Accountants, 2002), Martin's Auditing Red Flags (2007), or Thomsett's Red Flags in Revenues (2007), as the intent was to provide a specific technique to provide a signal, more useful than a myriad of lesser signals, of the possibility of financial reporting fraud. Finally, the gap in the literature was for a simple, single-variable model that by its design eliminated the potential for false positives, attenuation of effect, and the potential for orthogonal bias caused by over-specified or overly complex multivariate models used by Beneish (1999), Lee et al., or as described by Dechow et al. (1995).

Theoretical Framework

The underlying framework that supported this research, and within which this research fit, was composed of both theoretical and applied material. Within practitioner research and publication were a great many studies that pointed auditors, regulators and other users of financial statements to sensible techniques that might be used to help in the basic problem of identifying

fraudulent financial reporting. The auditing standards for financial statement audits for non-issuers, issued by the American Institute of Certified Public Accountants in its role as promulgator of auditing standards, fell into this practitioner literature category, as did the publications of the Association of Fraud Examiners.

The other major category of the framework that supports the research in financial reporting fraud detection was theoretical material in the academic literature of accounting, finance, and fraud examination. Because operating activity cash flows were often assumed to follow earnings from continuing operations it should have followed that otherwise unexplained discrepancies in the relationship of cash flow from operating activities to earnings from continuing operations indicated fraud or error in the financial reports. Researchers in academia have developed many models to help detect fraudulent financial reporting (Dechow et al., 1995) and the literature includes academic researchers such as Beneish (1999) and Lee et al. (1999) who attempted to build multivariate models to detect financial reporting fraud based on the analysis of various financial ratios and company circumstances.

The academic research category of the theoretical framework supporting work in the area of financial reporting fraud detection was supported by two additional subdivisions. The first of these subdivisions of academic research concerned the accruals anomaly (Cheng & Thomas, 2006; Cotten, 2005; J. Jones, 1991). The accruals anomaly was a set of observed phenomena in the market pricing of equity securities with and without significant accruals in addition

to their cash earnings. This area of research, tantamount to studies of the relationship of cash flows to earnings, was not focused primarily on fraudulent financial reporting or the detection of fraudulent financial reporting, but provided numerous theoretical models designed to disaggregate earnings into its components cash flows from operating activities and non-cash accruals that are essential background for the current fraudulent financial reporting studies. The accruals anomaly research began with Jones (1991), who developed the original model (now known as the Jones model) to deconstruct reported earnings into a cash flow component and discretionary and non-discretionary accruals that either increased or decreased income. In addition to Jones, researchers in the accruals anomaly area, and the more directly related research of Beneish and Lee et al., owed the predicates for their models to Altman (1968). Altman designed and tested a multivariate model used to calculate a probability of a company declaring bankruptcy within the next year.

Research Questions

The central premise of the research was to examine the extent to which analysis of the ratio of (a) cash flows from operating activities to (b) earnings from continuing operations, in a given accounting period and as the ratio changed from period to period, might be used to detect financial reporting fraud. The research was important to many in industry, government, and the academic community. The research was designed to build on the research of Beneish (1999) and Lee et al. (1999), and the accruals anomaly research currently debated in the academic literature, including multivariate-model fraud detection

research by Beneish (1999), Lee et al.(1999), the practitioner literature of fraud detection and auditing, and the accruals anomaly literature of researchers including Cheng and Thomas (2006), Cotton (2005), Dechow and Ge (2006), Desai, Rajgopal, and Venkatachalam (2004), Fairfield (2006), Pincus, Rajgopal, and Venkatachal (2007), Sloan (1996), Zach (2003), and Zhang (2007), and was intended to help users identify the incidence of fraudulent financial reporting from the evidence of the financial statements.

Q1: To what extent, if any, is there a correlation between (a) cash flows from operating activities and (b) earnings from continuing operations?

Q2: To what extent, if any, is the cash flow ratio (the ratio between (a) cash flows from operating activities and (b) earnings from continuing operations) different for firms with detected financial reporting fraud compared to firms without detected financial reporting fraud?

Q3: To what extent, if any, is there a change in the cash flow ratio (the ratio from (a) cash flow from operating activities to (b) earnings from continuing operations), for fraud firms before and after the identification of fraudulent financial reporting?

Hypotheses

Null and alternate hypotheses $H1_0$, and $H1_a$, flowed from research question 1. Hypotheses $H2_0$, $H2_a$, $H3_0$, and $H3_a$ flowed from research questions 2 and 3.

$H1_0$: There is no correlation between (a) cash flows from operating activities and *(b)* earnings from continuing operations for firms across the data.

$H1_a$: There is a correlation between (a) cash flows from operating activities and *(b)* earnings from continuing operations for firms across the data.

$H2_0$: There is no difference in the cash flow ratio for firms with identified financial reporting fraud compared to firms without identified financial reporting fraud.

$H2_a$: There is a difference in the cash flow ratio for firms with identified financial reporting fraud compared to firms without identified financial reporting fraud.

$H3_0$: There is no change in the cash flow ratio for fraud firms before and after the identification of fraudulent financial reporting.

$H3_a$: There is a change in the cash flow ratio for fraud firms before and after the identification of fraudulent financial reporting.

Nature of the Study

The study consisted of quasi-experimental design static pre and post treatment tests, with control groups. The research was intended to build on the work of Beneish (1999), Lee et al. (1999), Dechow et al. (1995) and others to determine if changes in the cash flow ratio—the relationship of (a) cash from operating activities to (b) earnings from continuing operations—in the current period, compared to previous periods, may indicate the presence of fraudulent financial reporting. The main research variable was the cash flow ratio. This dependent variable was chosen for the focus of the research in part because of its simplicity, as a simple measure may become a more practical tool for stakeholder users of financial statements. The cash flow ratio is a construct

representing the ratios of cash flow from operating activities to earnings from continuing operations.

The sample of fraud firms was drawn from a database prepared as part of a report to Congress mandated by the Sarbanes-Oxley Act of 2002 (United States Government Accountability Office, 2007). Calculated minimum sample sizes for the means comparisons, given the finite population of firms in the GAO database of 2,309, and controlling the smallest effect size by setting Cohen's *d* to .2 limited the sample size necessary for the comparison of independent means tests to 812 test units in two samples of 475 and 337 units (Faul et al., 2007; Hopkins, 2008; Kelley, 2005). The level of significance was set at .05, and the desired power of the tests was set at an 80% probability (*beta* set at .2) of identifying fraud/restatement without a Type II error.

Correlation analysis—calculating Pearson's *r*— was used to determine the strength of correlation between cash flows from operating activities and earnings from continuing operations, for firms without detected financial statement reporting fraud and for firms with detected financial statement reporting fraud. These calculations, confirming the expected correlation between earnings from continuing operations and cash flows from operating activities, were prepared as predicates to the *t*-tests for the second and third research questions, which were studies of the cash ratios composed of these two components. A quasi-experimental static design including pre and post treatment analysis, with randomized and blocked data, was used to test if the cash flow ratio was different for a treatment group of firms with identified financial statement reporting fraud

versus a control group without identified financial statement reporting fraud, using *t*-tests comparing means. Finally, a design without a control group was used to determine if the means of the cash flow ratios were different for firms with identified financial statement reporting fraud before and after the identification of the fraud. This calculation was also done using a *t*-test comparing means

Significance of the Study

Though the median financial reporting fraud misstatement has been only about $2.0 million, some recent financial statement frauds, such as HealthSouth that reported over $2.5 billion in fake earnings (Tonsick, 2004), and WorldCom's total of $7.68 billion earnings from improper accounting (Beresford, Katzenbach, & Rogers, 2003; Gibson, 2004) have been spectacular. The Federal Bureau of Investigation reported more than 400 corporate fraud cases in 2006 alone, with 19 that resulted in losses to the public in excess of $1.0 billion each (Federal Bureau of Investigation, 2007). The cost of occupational fraud may have been has high as $994 billion in 2007, up from $650 billion for 2005 (Association of Certified Fraud Examiners, 2006, 2008). Fraud losses from financial reporting fraud may be as much as $102 billion for 2008. Some sources report approximately 45% of financial statement fraud schemes involved either concealed or unreported liabilities or fictitious revenues, directly affecting the earnings and cash flows relationship (Association of Certified Fraud Examiners, 2008). Other sources have reported core issues involving income statement items related to continuing operations are involved in 63% of financial restatements (Palmrose & Scholz, 2004). The proportion of cases of fraudulent

financial reporting involving the components of the cash ratio (the subject of this research) is high, and the dollar cost of such frauds is large.

The idea of decreasing cash flows from operations in the presence of increasing reported earnings as a strong indicator of fraudulent financial reporting has significant support (Albrecht et al., 2006; Arens et al., 2005; Moyes, Lin, & Landry, 2005; Securities and Exchange Commission, 2003a). This intuition, based on knowledge of accounting, was confirmed by Dechow, Kathari, & Watts (1998).The American Institute of Certified Public Accountants, in Statement of Auditing Standards 99, Consideration of Fraud in a Financial Statement Audit (2002), stated a company's failure to produce cash flows from reported earnings is a red flag for financial statement fraud, and the Securities and Exchange Commission (2003a) has indicated that some companies may engage in complicated financial activities to provide a masking effect to cover the failure of the firm to produce operating cash flows appropriately related to reported earnings. The manipulations at Enron presented an extreme example of masking activities (McLean & Elkind, 2003).

The problem of identification of fraudulent financial reporting holds significant interest. The Association of Certified Fraud Examiners (2008) estimates imply that losses caused by financial statement reporting fraud for the United States in 2008 may be as high as $102 billion. The investing public cannot distinguish earnings restatements caused by error from those caused by fraud to detect fraudulent financial reporting earnings restatements (Bryan, Lilien, Ruland, & Sinnett, 2005). This inability to distinguish restatements caused by fraud from

restatements caused by error affects investor expectations about future cash flows and stock prices. Investors, regulators, creditors, and other users of financial statements cannot distinguish between earnings generated by current cash flows and earnings generated by accruals, and cannot distinguish non-discretionary accruals such as appropriate recording of accounts receivable or depreciation, from discretionary accruals with a fraudulent intent, and again, this affects stock prices (Cheng & Thomas, 2006; Cotten, 2005; Dechow & Ge, 2006; Sloan, 1996; Woodgate, 2007; Zach, 2003; Zhang, 2007).

The contribution to the literature from this study is potentially significant given that fraudulent financial reporting is a serious problem involving significant losses to the investing public, regulators, creditors, financial analysts, auditors, and others. Like other methods in the literature, the technique of looking for change in firm's cash ratio offers only a signal that financial reporting fraud may have taken place. Investors, regulators, auditors, and others interested in financial statement reporting fraud for a specific firm should consider that signal in the context of the activities of management of the firm and in conjunction with a thorough risk assessment based on an understanding of the company's internal accounting control structure and company practices, and in concert with other analytical techniques available in academic and practitioner literature in the anti-fraud, audit, and investing arenas.

Definitions

This section contains definitions of construct terms not commonly used in financial and accounting literature, and key operational terms used in the study.

Conceptual definitions are delineated for each of the independent and dependent variables identified as key operational terms.

Cash flow ratio. As defined by the author for this study, the phrase *cash flow ratio* has been used to indicate the continuous ratio of cash flow from operating activities for a given accounting period to earnings from continuing operations for the same period. This is not a phrase or ratio normally used in financial and accounting literature. Cash flow from operating activities and income from continuing operations were found in company financial statements prepared in accordance with generally accepted accounting principles in the United States, the components of the cash ratio, are well defined in the accounting literature (Financial Accounting Standards Board, 1984, 1985). The cash flow ratio is also called the cash ratio.

Company type. As defined by the author for the study, the phrase *company type* was used to indicate companies either with or without identified instances of financial reporting frauds that involved fictitious, surreptitious, or clandestine entries in the sales, receivables, payables, and related working capital accounts normally associated with cash flows from operating activities.

Summary

Financial statement fraud is a continuing problem annually involving billions of dollars in losses (Association of Certified Fraud Examiners, 2008; Federal Bureau of Investigation, 2007; Wells, 1997). Identification of fraudulent financial reporting is a subject of interest to the investing public, academics in accounting and finance, regulators, and other users of financial statements

(Beneish, 1997, 1999; Dechow et al., 1995; Federal Bureau of Investigation, 2007; Lee et al., 1999; Securities and Exchange Commission, 2003a).

This study was designed to expand on and improve the work of Beneish (1997, 1999), Lee et al. (1999), Dechow et al. (1995), and others, and was intended to provide auditors and other interested users of financial statements a reliable, useful technique for detection of fraudulent financial reporting. This contribution was potentially significant given that fraudulent financial reporting is a serious problem involving significant losses to the investing public, regulators, creditors, financial analysts, auditors, and others.

CHAPTER 2: LITERATURE REVIEW

In the literature of the detection of financial reporting fraud there appear to be four major categories of endeavor. First, there is practitioner literature found in scholarly academic journals, trade journals, and magazines. Practitioner literature includes what has been referred to in accounting and auditing as *authoritative literature* (Nikolai, Bazley, & Jones, 2010). Authoritative literature has included pronouncements of standard setting boards governing accounting and auditing including standards constituting the bulk of generally accepted accounting principles in the United States, from the Financial Accounting Standards Board (Securities and Exchange Commission, 2003b) and statements on auditing standards establishing the bulk of generally accepted United States auditing standards from the American Institute of Certified Public Accountants and the Public Companies Accounting Oversight Board. Practitioner literature generally has included the assumptions that cash flows follow earnings, and that the failure of reported earnings ultimately to produce cash should constitute a warning to auditors, investors, regulators, and other users of financial statements that something may not be right in the financial statements (Albrecht et al., 2006; American Institute of Certified Public Accountants, 2002; Wells, 1997).

The second category or subdivision of the academic literature of financial statement fraud includes attempts to detect fraudulent financial reporting through traditional audit-based analysis and the literature of the fraud examination profession. Beasley et al. (1996), for instance, studied the relationship of fraudulent financial reporting and the proportion of members of the company's

board of directors who were insiders. This literature also includes the work of Bryan et al. (2005), Cohen, Dey, and Lys (2008), Doyle, Weili, and McVay (2007), and others. The profession and the Certified Fraud Examiner designation are 20 years old (Association of Certified Fraud Examiners, 2009). The professional and academic literature of the profession includes traditional analytical techniques of auditors discussed by Albrecht (2006), Harrington (2005) and Lindsay, Foote, Campbell, and Reilly (2004), Wells (2001), and Moyes, Lin, and Landry (2005). Fuzzy algorithms for the detection of fraudulent financial reporting were discussed by Lin, Hwang, and Becker (2003). Elements of the financial analysts literature introduced the idea of assessing earnings quality by examination of the relationship between cash flow and net income as it changed over time (Palepu & Healy, 2008).

The third category of the literature of financial statement fraud is comprised of research about various phenomena surrounding the so-called accruals anomaly. Begun by Jones (1991) and Sloan (1996), and pursued by Cheng and Thomas (2006), Cotten (2005), Dechow and Ge (2006), Desai (2004), Fairfield (2006), Liu (2006), Pincus (2007), Woodgate (2007) and many others, the accruals anomaly had to do with the idea that investors could not perceive the difference in accruals and cash earnings, and therefore miss-priced securities with high accrual earnings content. Many of these researchers were concerned with statistically disaggregating earnings into cash and accrual components, while others were concerned with observation of the anomaly phenomenon in various settings: evidence from Europe, effects on stock returns,

as related to special items, in juxtaposition to the related value-glamour mispricing phenomenon, before and after the Sarbanes-Oxley Act of 2002, and so on.

Publications in academic or scholarly research included works that reported attempts to create complex statistical financial models for the detection of fraudulent financial reporting. These models were generally based on analysis of different aspects of firms' financial statements and analytical reviews of ratios based on those financial statements, with emphasis on statistical analysis, relationships, and correlations. This category includes published works of Beneish (1997, 1999, 2001), Dechow, Sloan, and Sweeney (1995), and Lee et al. (1999).

Authoritative Literature

The authoritative literature of the financial and accounting practitioner begins with the promulgated Statements of Financial Accounting Standards of the Financial Accounting Standards Board (Securities and Exchange Commission, 2003b), the auditing standards of the American Institute of Certified Public Accountants and the audit standards of the Public Companies Accounting Oversight Board (2009). In particular, the conceptual framework for financial reporting in the United States has rested on Statement of Financial Accounting Concepts No. 1 (Financial Accounting Standards Board, 1978).This has been the conceptual foundation for modern financial accounting in the United States. It established the major precepts of accrual accounting, justifying accruals that affect earnings in the current period without an effect on cash flows for the same

period. This theoretical base was the foundation of the study in the sense that it was changes in the differences between cash flows from operating activities and earnings from continuing operations, as an indicator of fraudulent financial reporting, which were the focus of the dissertation. Under accrual accounting, realizable cash related to recognized revenues and gains is recorded as an accrual, whether the related cash is received before, during, or after recognition (Financial Accounting Standards Board, 1984). Fictitious, fraudulent revenue frequently has led to recognition of accounts receivable that were also fictitious and would never be realized as cash (Public Company Accounting Oversight Board, 2007).

One of the objectives of financial reporting incorporated in Statement of Financial Accounting Concepts No. 1 (Financial Accounting Standards Board, 1978) was to provide investors, creditors, and others information about cash flows that was useful and reliable in evaluating liquidity, understanding business operations, evaluating financing and investing, and interpreting comprehensive income information about a company. Statement of Financial Accounting Concepts No. 5 (Financial Accounting Standards Board, 1984) dealt with the concept of recognition of revenue, which was also central to this study. Revenue (and gains) must not only have been earned (or the process of earning must be substantially complete) to be recognized in the financial statements, the revenue or gain must have been realized or realizable. Realization is the process of changing assets, such as the accounts receivable that result from recognition of sales revenue, into cash (Financial Accounting Standards Board, 1985), and the

collection of that cash can occur before, at the time of or after the sales revenue is recognized. Accordingly, it is axiomatic that at some point in the cycle of a business entity's operations, recognized sales revenue must convert into cash. In the ordinary course of business, it has been expected that some credit sales ultimately may not be realized. Generally accepted accounting principles provide that these losses be recognized in the accounting period in which the sales revenue is first recognized through the provision of an allowance for uncollectible accounts (Financial Accounting Standards Board, 1984).

The construction of the statement of cash flows for a business also has been governed by the Concept Statements and Statement of Financial Accounting Standards 95, The Statement of Cash Flows (Financial Accounting Standards Board, 1978, 1984, 1987). Both the direct and indirect methods for the construction of the statement of cash flows are allowed. The direct method uses the income statement and the details of operating transactions to calculate cash receipts and disbursements for a period, by showing major categories of cash received and disbursed, on a gross basis. The indirect method starts with net income, and adjusts for changes in working capital accounts to arrive at cash from operating activities, netting the gross cash receipts and disbursements from operations against each other in the process. Regardless of method, the requirement is to separate cash flows according to source: operating activities, investing activities, and financing activities, and under both methods, to provide a reconciliation of net income to the total cash flows from operating activities. This is accomplished in the indirect method by beginning with net income, and

adjusting for the effects of deferred operating cash receipts and accrued operating cash receipts and payments, and other items included income that do not create operating cash receipts or payments. Because the focus of this study lay in the comparison of reported cash receipts from revenue and reported revenue, the simplest and most direct procedure was to collect data regarding the operating cash receipts from revenue from direct method statements of cash flow. Unfortunately, such data does not exist, as 99% of companies use the indirect method (*Accounting Trends and Techniques*, 2007. In Nikolai et al., 2010).

Traditional Analysis

Traditional analysis is characterized by both practitioner literature and scholarly, academic literature. On the practitioner side there is the growing body of work related to the Association of Certified Fraud Examiners (2009; Carozza, 2008). This organization, with more than 50 thousand members, is the leading private organization dedicated to the prevention and detection of white-collar crime, including financial statement reporting fraud. The Association of Certified Fraud Examiners is the publisher of *Fraud Magazine*, in the format of a trade journal. Content of the magazine has included, for instance, a review of the work of Beneish, with practical tips on how it might be used (Harrington, 2005), and another article about statistical approaches to fraud detection in financial statements using a proprietary computer based intervention detection tool (Lindsay et al., 2004).

A useful analysis of fraudulent financial reporting instances investigated by the Securities and Exchange Commission and background information about fraud in financial statements was published by the Committee of Sponsoring Organizations of the Treadway Commission (Beasley, Carcello, & Hermanson, 1999). Beasley also did research that showed a relationship between larger proportions independent directors on boards of public companies and significantly reduced incidents of financial statement fraud, and showed decreased fraud when the number of outside directors increased and the number of outside directorships of outside directors decreased (1996). Beasley, Carcello, and Hermanson also reported on steps that could be taken to help prevent fraudulent financial reporting, based on their analysis from the Committee of Sponsoring Organizations report (2000). Doyle, Weili, and McVay (2007) related poor quality accruals (those that do not result in future cash flows) to reported material weaknesses in internal control, but the control weakness most strongly related to the poorly estimated accruals were general observations about the company's system of internal controls. They reported that disclosures of material control weaknesses related to specific accounts did not support the relationship.

Bryan et al. (2005) published a discussion of earnings restatements from the perspective of their effects on investor expectations about future cash flows and stock prices. This is important because it demonstrated the need for a tool that investors and others could use to separate restatements to correct error from those to correct fraud, and ultimately to detect fraudulent financial reporting. Cohen et al. (2008), documented the effect of Sarbanes-Oxley on the character

of management manipulation of earnings. Results indicated accruals-based earnings management peaked prior to passage of Sarbanes-Oxley, to be replaced by real earnings management techniques that could be damaging to the companies, including reduction of advertising, delay or deferral of maintenance, reductions in research and development expenditures, accelerating the timing of sales by offering increased price discounts and lowering the average overhead cost charged to inventory and cost of goods sold by unnecessarily increasing production. Their accruals measure was made with the modified Jones model (1991) described by Dechow et al. (1995).

Traditional analysis also exists in the securities analysis and investing literature, such as Thomsett's (2007) work as an investment advisor's assessment of how trouble could be spotted when profit margins were falling on rising revenues. Without consideration of possible fraud, Thomsett warned of reasons margins might fall, including top-level mismanagement and management compensation that outpaced profit growth, industry cycles, failure of controls to restrain cost growth, and other reasons costs might have risen faster than revenues. Wells (2001) interviewed Barry Minkow, the fraudster who fooled investors, Wall Street underwriters and his auditors with the infamous ZZZZ Best carpet cleaning and restoration company. Wells examined the basics of financial ratio analysis espoused by Albrecht (2006), and Beneish's (1999) use of key ratios, to detect fraudulent financial reporting. Comparison of company financial ratios to industry ratios for a period of years, and comparison of company ratios to one another for a period of years is often suggested (Association of Certified

Fraud Examiners, 1999; McMillan, 2006). These comparisons demonstrated the way in which fundamental analyses have relied on the relationships among the balance sheet, income statement, and statement of cash flows.

The auditing literature includes many articles about red flags or warning signals that auditors and others could use to gain heightened awareness of the possibility of fraudulent financial reporting. Moyes et al. (2005), discussed Statement of Financial Accounting Standards No. 99's listing of 42 red flags and the effectiveness of those red flags in fraud detection, based on a survey of internal auditors. They reiterated the idea that continuing negative cash flows from operations and the failure to generate cash flows while reporting growth in earnings was a strong fraud signal. Lin et al. (2003), evaluated the utility of an integrated fuzzy neural network for fraud detection, using levels of change in gross profit ratios and in ratios about relationships of sales, accounts receivable, and allowance for doubtful accounts as indicia of ranges of possible fraud.

A pre-1990 review of available methods for fraud detection can be found in the work of Eilifsen and Messier (2000). Statements of Auditing Standards 104 through 111 (Fogarty, Graham, & Schubert, 2007; Fogarty, Landes, Goldwasser, Graham, & Messier, 2006), for audits of non-issuers after December 15, 2006, deal with risk assessment, including what to do about assessed risk in a financial audit. These risk management Statements of Auditing Standards were intended to guide auditors in their assessment of and response to the risk of material misstatement in financial audits. Statements of Auditing Standards 104 through 111 are important because they show how professional auditors in the field work

to assess audit risk, including the risk of fraudulent financial statement reporting. Statement of Auditing Standards 99 (American Institute of Certified Public Accountants, 2002) and numerous other sources (Gill & Wells, 2007; Martin, 2007; Ricchiute, 2003; Thomsett, 2007) directed auditors to assess the risk of financial statement fraud and provided guidance in the form of red flags that warrant heightened auditor awareness of the possibility of fraud. Among these red flags was the idea, expressed in several ways, that cash flows must ultimately follow reported earnings. Palepu and Healy (2008) suggested study of changes in the relationship of operating cash flows to income from operations to assess the quality of reported earnings, indicating that fictitious accounts receivable were never collected.

Accruals Anomaly

The accruals anomaly, which came from the observation that the magnitude of the accrual component of earnings relative to the cash portion was directly correlated to security prices and returns (Cotten, 2005; J. Jones, 1991) has been the subject of significant peer reviewed scholarly research. The anomaly itself was that investors did not distinguish between high-accrual content earnings and high-cash content earnings, and thereby miss-priced securities (Sloan, 1996), overpricing earnings with a high accrual content, and under pricing securities with a high cash content. Sloan's conclusions were based on calculations of the slopes of least squares regressions (to measure earnings persistence) in which the dependent and independent variables were future earnings and current earnings, with current earnings ranked by level of

accrual content. These calculations were made for large numbers of firms for many years. Sloan's results reflected that earnings of high accrual firms were less persistent than earnings of firms with low accrual content.

Earnings consist of cash flows plus accruals (Cotten, 2005; Desai et al., 2004; Singal, 2004). Accruals anomaly researchers have observed that markets price securities in proportion to the accrual portion of the earnings without regard for whether the accruals were of the discretionary or the more appropriate non-discretionary character (Rosner, 2003). Very high accruals yielded very high securities prices and abnormal returns, regardless of the quality of the earnings (Cheng & Thomas, 2006; Dechow et al., 1995; Lee et al., 1999; Q. Liu & Qi, 2006; Zach, 2003) and regardless of whether the firms involved were international or domestic (Pincus et al., 2007). While they replicated some of the previous accruals anomaly work, Pincus et al. used multinational and international firm data, thus globalizing the conceptual infrastructure upon which studies of the accruals anomaly were based.

Sloan (1996) made an observation about the nature of the data that was important to this research. Although the operating activities section of the statement of cash flows contains a reconciliation of net income to cash flows from operations, Sloan used accruals data taken from balance sheets rather than statements of cash flows. The statement of cash flows began for public companies with Financial Accounting Standards Board Statement of Financial Accounting Standards No. 95 in 1987. Prior to the publication of Statement of Financial Accounting Standards 95, companies reported a statement of sources

and uses of funds, with funds usually defined as working capital (Thompson & Buttross, 1988). Thus in the databases that Sloan and others were using, for the years they researched, statement of cash flows data were not consistently available.

Thompson and Buttross (1988) reprised the history of the statement of changes in financial position from its earliest incarnations in 1893 at the Missouri Pacific Railroad, 1902 at United States Steel, and in early textbooks of the time, through the end of the statement in 1987. The statement was also called the statement of sources and uses of funds, with funds usually defined as working capital. Accounting Principles Board Opinion No.19, adopted in 1971, formalized the statement of changes on a working capital basis as one of the three basic required financial statements. Accounting Principles Board Opinion 19 was replaced by the Financial Accounting Standards Board, with the adoption of Statement of Financial Accounting Standards 95 in 1987. This did away with the statement of changes in financial position, and replaced it with a required statement of cash flows in the format in use today. The statement of cash flows is divided into operating, investing, and financing components, and requires a reconciliation of cash flows from operating activity to net income in the operating section. As noted (Sloan, 1996), under the indirect method used by most companies, the reconciliation begins with net income, meaning that gross cash receipts from operations and gross cash disbursements for operations are netted against each other. To this net figure, changes in working capital accruals and

deferrals, and other non-cash items are added, producing the cash flows from operating activity number.

The investing public does not distinguish between discretionary and non-discretionary accruals, and there is a price momentum anomaly associated with both (Woodgate, 2007). Examples of non-discretionary accruals and restatements are found in the work of Cohen, Dey, and Lys (2008). Cohen et al. documented the effect of Sarbanes-Oxley on the character of management manipulation of earnings. Results indicated accruals-earnings management peaked prior to passage of Sarbanes-Oxley, to be replaced by real earnings management techniques that could be damaging to the companies, including reduction of advertising, delay or deferral of maintenance, reductions in research and development expenditures, accelerating the timing of sales by offering increased price discounts and lowering the average overhead cost charged to inventory and cost of goods sold by unnecessarily increasing production. Cohen et al.'s accruals measure was made with the modified Jones (1991) model described by Dechow et al. (1995).

Zhang (2007) added to the understanding of the possible effects of changes in cash flows or earnings driven by fraudulent financial reporting. Zhang further examined the accruals anomaly, and related the investor mispricing of accruals (versus cash flows) to the firm's business model and the investment information contained in the accruals. Contrary to the persistence or lack of persistence models used to explain variations in the accruals anomaly, Zhang showed covariation between signals of firm health and growth, such as hiring

new employees, and stock returns. Zhang advanced knowledge of the anomaly by relating it to non-accounting based measures, focusing on the information content of the accruals that is outside the normal accounting and financial reporting processes. Zack (2003) expanded analysis of abnormal accruals and showed extreme accrual firms may have had sticky accruals that continued over time, versus low accruals firms whose accruals may not have been sticky. Zack's work had implications for investor strategies, and directly related to the importance of the possibility of financial statement fraud. Even Sloan (1996), in the study that initiated the accruals anomaly literature, pointed out that the Financial Accounting Standards Board, in its process of developing the rules for the statement of cash flows, and Bernstein (1993 as cited in Sloan (1996)), acknowledged that high net income and low cash flows may indicate that inappropriate recognition criteria may be in use.

Dechow and Ge (2006) asserted that high discretionary accruals were driven by income statement based accounting rules, whereas low discretionary accruals resulted from application of more conservative balance sheet accounting rules. Earnings persistence was influenced by the sign of accruals as well as by their absolute magnitude. In higher accrual firms, income statement driven accruals provided earnings persistence relative to cash flow, and low accruals were related to lack of earnings persistence. The Dechow and Ge research has been characterized as incorrectly specified in the sense that its perspective acted as a self-imposed scope limitation (Fairfield, 2006). Dechow and Ge wrote about the association of high accruals and high persistence

earnings with income statement driven accounting rules, and the association of low persistence, low accruals earnings with more conservative balance sheet driven accounting rules, from the perspective of study of the accruals anomaly, but the research was descriptive, without attempting to use the information to detect fraud. Fairfield suggested that many important questions and insights were thereby missed, and that giving the paper an alternative point of view such as how a matching perspective versus a fair value perspective might affect accruals and earnings persistence, could have led to more substantive contributions to the study of earnings, accruals, and the accruals anomaly.

Liu (2007) suggested that inherently negative accruals, such as depreciation, were negatively correlated with future cash flows. That is, the discretionary portion of the conservative reporting of depreciation was negatively related to future cash flows. This meant that high discretionary depreciation accruals were associated with increased future cash flows relative to earnings. Inherently the choice of depreciation method has no effect on cash flows, but management sends signals about their perception of future success for the firm by their choice of conservative short estimates of useful lives and choices of accelerated methods, discretionary depreciation estimates, and methods, revealing private information content. Future cash flows were strongly negatively correlated with discretionary depreciation expense. This had implications for the accruals anomaly discussion, and importance for the detection of earnings manipulation and fraud.

McNichols (2000) echoed the misspecification critique of earnings accruals models used to disaggregate earnings into cash and accrual components, suggesting models that did not consider long-term growth in earnings might have been incorrectly specified and may have led researchers to erroneous conclusions with regard to management involvement in earnings manipulations. This was directly on point for the dissertation and the construction of the model and hypotheses with regard to fraud detection using the relationship of cash flows and earnings. McNichols further suggested that future progress in earnings management studies was more likely to come from studies based on the distribution of earnings after manipulation rather than from studies based on aggregate accruals.

The final critique of the accruals anomaly literature rests in the relative weakness of the various earnings disaggregation models as predictors of accruals (Thomas & Zhang, 2000). Thomas and Zhang tested the six major accrual disaggregation models, considered (a) a random walk model, (b) a mean-reverting accruals model, (c) a components model, (d) the Jones model, (e) an industry model, and (f) the KS model. These models are derived from the literature and can be found in the following sources: (a), (b), and (e) are from Dechow et al. (1995); (d) Jones is from Jones (1991); (f) the KS model is from Kang and Sivaramakrishnan (1995 as cited in Thomas & Zhang (2000)) . The components model (c) is from the Thomas and Zhang article. The Thomas and Zhang study showed that only the KS model showed any ability to predict accruals, with all but the KS performing worse than a simple prediction of 5% of

total assets for accruals for all firms for all years. Thomas and Zhang calculated regressions of actual accruals against predicted accruals, model by model, and produced coefficients of correlation less than zero for the prediction periods, versus much higher figures for the estimation periods. Only the Jones model showed some predictive ability.

Fraud Detection Models

Closely related to the accruals anomaly research was the work of Beneish (1997, 1999) and Lee et al. (1999). These unrelated peer reviewed scholarly researchers constructed multi-variant models derived from statistical analyses intended to detect discretionary or fraudulent abnormal accruals, that is, to detect fraud. Besides their debt to Jones (1991), who developed the original model (now known as the Jones model) to deconstruct reported earnings into a cash flow component and discretionary and non-discretionary accruals that either increase or decrease income, both Beneish and Lee et al., probably owed the predicates for their models to Altman (1968). Altman designed and tested a multivariate model used to calculate a probability of a company declaring bankruptcy within the next year.

Both Beneish (1997, 1999) and Lee et al. (1999), included statistics based on the relationship of earnings and cash flows together with other financial statement ratios and statistics, and both used comparisons to industry averages. These were groundbreaking models, well motivated and researched, but neither model produced a fraud detection result with a high enough accuracy to present more than a red flag or warning of possible fraudulent reporting. Beneish's model

accurately predicted fraud 50% of the time and Lee et al. claimed a 73% detection success rate for their model. The studies prepared by Lee et al., and by Beneish, were robust with very large samples, and both drew on databases similar to the data for the research in this dissertation. Both appeared to have high external validity in that their results seemed to generalize and apply without regard to limitations such as industry classification, company size, and so on. Like the current research, both had some problems with internal validity because of the challenging circumstance of working with fraudulently produced data in the fraud firms, and data that may have been tainted with undetected fraud in the non-fraud firms. Additionally, Lee et al., may have had an issue with internal validity because of misspecification in that the cause and effect relationship in their model definition was reversed. Beneish had some internal validity issues from the introduction of non-causative variables in his model. These factors, based on preconceived notions of what fraud firms might look like, included Beneish's variables for quality of assets, a depreciation index, and other factors descriptive of fraud firms, but that were not the cause of the fraudulent financial reporting. These types of variable specification can induce orthogonal effects that challenge internal validity (Dechow et al., 1995; Trochim, 2001).

Though the models used by accruals anomaly researchers generally were good at showing the anomaly existed, it was demonstrated as a statistical conclusion, generally using very large samples drawn from the Compustat database or other approaches to proof using statistical inference (Cheng & Thomas, 2006; Cotten, 2005; Dechow et al., 1995; Lee et al., 1999; Zach, 2003).

No single independent variable appeared to identify fraudulent accruals with statistically reliable significance. Other research, including Beasley (1996), demonstrated statistical relationships between increased proportions of independent directors on boards of public companies and significantly reduced incidents of financial statement fraud. This observation by Beasley showed that red flags of fraud could be statistically isolated.

Beneish (1997, 1999, 2001) developed a model with eight variables to identify financial statement frauds. Beneish's variables included changes in working capital assets and liabilities over time as proxies for cash flows to earnings comparisons. Beneish also included several financial statement based variables other than the cash flows to earnings relationship, such as a depreciation index, a sales growth index, a gross margin index, and so on, among his dependent variables that might signal fraud. In Beneish's work, the indices used were simple year over year ratios that served to code the data for comparability from one company to another, without reference to the absolute magnitude of the underlying numbers. Beneish's variable for accruals to total assets, calculated as the change in working capital accounts exclusive of cash, less depreciation, as a decimal fraction of total assets, was used as a proxy for the relationship of cash flows to total earnings. Hribar and Collins (2002) reported on the effect on the results obtained from accruals estimation models from use of measurements from the change in balance sheet accounts as opposed to taking the accruals measurement data directly from the cash flow statements. Results indicated that use of the balance sheet change data introduced bias toward Type

II errors in the presence of merger activity or discontinued operations. Sloan (1996), had discussed the reason for using balance sheet estimates of accruals rather than taking accrual data directly from the reconciliation of cash flows from operating activities to net income (contained in the operating cash flows section of the statement of cash flows): there were no such data prior to 1988, the inception of the statement of cash flows (Financial Accounting Standards Board, 1987). Today more than 20 year's accruals data are available from the statement of cash flows, and the Type II errors indicated by Hribar and Collins should not present.

Beneish (1997) also over sampled the manipulators in his database relative to their occurrence in the population. Because he built a dichotomous model indicating either fraud or no fraud, he used a weighted exogenous sample maximum likelihood probit to compensate, and used χ^2 tests of various characteristics to show his manipulator firms came from the same populations as the Standard Industrial Classification (SIC) code matched non-manipulators. According to Eliason (1993), maximum likelihood estimation is a statistical method for estimation of parameters as an alternative to ordinary least squares regression. Its usefulness lies in applications with dichotomous dependent variables, such as dummy variables for which the integer one indicates financial reporting fraud was present and zero represents cases in which financial reporting fraud was not present. In these cases least squares regression as an estimator of parameters was inefficient because the error (ε) in the simple model ($Y = a + bX + \varepsilon$) with the included dichotomous dummy variable cannot be

normally distributed. Additionally, others have shown that distributions of financial ratios may not have Pearsonian characteristics (Ashton, Dunmore, & Tippett, 2004; Barnes, 1982). Beneish's use of maximum likelihood estimation produced estimates that were asymptotically consistent, approximating normal distributions, for which significance tests were appropriate.

Beneish's (1997, 1999) work on the detection of earnings manipulation utilized quasi-experimental matched-pair (blocked) factorial designs structured to construct and then assess the efficacy of multivariate models of public company financial data, to distinguish firms engaging in earnings manipulation from firms not engaging in earnings manipulation. The results of Beneish's work have been widely cited and discussed in the financial literature and in finance texts used in graduate classes in financial statement analysis (Dechow et al., 1995; Stickney, Brown, & Wahlen, 2007; Wells, 2001). Jones (2004) also noted that Beneish's 1997 work did not address fraudulent financial reporting specifically, but was focused on firms charged by the Securities and Exchange Commission in Accounting and Auditing Enforcement Releases with violations of generally accepted accounting principles. The general research questions for Beneish's studies were "can accounting data be used to detect earnings manipulation?" (1999, p. 26). He used a general linear construct of the form $M_i = \beta X_i + \varepsilon_i$, for which M_i was the dummy dependent variable manipulator or non-manipulator (coded 1 and 0), X_i was a list of potential explanatory variables (generally items of interest on the balance sheet) and ε_i was the aggregate of errors in the regression, or as Beneish put it, "a vector of residuals" (p. 26).

Beneish (1999) discussed two phases of the study. First, he estimated his model for detection of earnings management and second, he used regression analysis in holdout iterations to assess the significance of each of the potential explanatory variables in the model. For this he used a sample of known manipulator companies, selected based on reports in the print media and Securities and Exchange Commission Accounting and Auditing Enforcement Releases over a period of years, and a sample of assumed non-manipulator companies matched to the manipulators by two-digit SIC numbers. Using the model derived from this heuristic process, Beneish assessed the effectiveness of the model to select or identify the manipulator companies by measuring the significance of the dummy variable representing manipulation or non-manipulation of financial statement data. Because Beneish (1999) dealt with ex post financial data, there were no threats to internal validity from demand characteristics (Zikmund, 2003) such as guinea pig effect, Hawthorne effect, maturation or mortality of subjects, testing effects, instrumentation, or interviewer biases.

Lee et al. (1999) established that there was a statistically significant relationship between the incidence of discovered fraud and the difference between earnings and cash flows. In work done contemporaneously with the Beneish (1999, 2001) studies, these researchers produced a similar multivariate model in which the dependent variable was the discovery/non-discovery of fraud in the financial statements, and the main explanatory independent variable was earnings minus operating cash flow. They defined fraud firms narrowly, as those

public companies identified in Securities and Exchange Commission Accounting and Auditing Enforcement Releases and the financial press as charged with violations of the fraud reporting provisions of the Securities Act of 1934. They limited their model to a set of 14 variables, and tested using an iterative holdout procedure to assess the significance of each variable in the prediction model, with samples from a group of known fraud companies and from a control group of companies not identified with fraud, matched by SIC codes. Lee et al.'s measurements were straightforward, with the primary variable, reported earnings in excess of operating cash flow, equivalent to a proxy for total accruals. Lee et al. excluded depreciation from the total accruals figure by adding depreciation expense to reported earnings. The other 13 variables were used as control features, such as a variable to identify high-risk industries in which cash flow to earnings ratios might be higher than in other industries, or where it was thought there might be a higher or lower predisposition to fraud risk.

Dechow, Kathari, and Watts (1998) established a correlation between current operating earnings and future cash flows that was stronger as a predictor of future cash flows than current cash flows. Additionally they showed a negative serial correlation in firms' operating cash flow changes. Dechow et al.'s research showed confirmation of the intuitive construct for cash flow derived from operating earnings, based on understanding of the accounting process. The statistical underpinning of the relationship between cash flow from operating activities and earnings from continuing operations that was the intuitive predicate for the bulk of the financial reporting fraud literature was shown tangentially in the

Dechow et al. research. Lee et al. (1999) demonstrated the relationship of fraudulent financial reporting to the magnitude of the difference between cash flow and earnings.

Lee et al. (1999) also were cognizant of the difficulty of identifying the year in which fraudulent financial reporting began. As they observed, the year of discovery or the year that is first discovered often may not be indicative of the initial fraud year. They assumed that the fraud occurred in the year immediately preceding the year of discovery, and limited their analysis to no more than three years prior to the discovery. Use of the GAO database of public companies that restated earnings over a substantial period was intended to ameliorate this difficulty. Though it is not conclusive, it seems reasonable to assume that when a fraud firm becomes aware of the need to restate earnings, the firm will restate the earliest year in which fraud material to the financial statements occurred. Thus, use of the restatement database should at least go toward solving the problem of identification of the first year of fraud. Mitigating against this is the restatement requirement in generally accepted accounting principles that errors in prior period financial statements discovered after their issuance are to be corrected by restating the prior periods affected, but that the cumulative effect of the errors on periods prior to those presented is to be corrected by adjustments to the carrying values of the assets and liabilities at the beginning of the first period presented (Financial Accounting Standards Board, 2005). Like Beneish (1999), Lee et al. (1999) coded their accrual data by indexing it to total assets for each firm each

year. Dechow et al., followed this practice as well, as they put it rendering their data "standardized by lagged total assets" (1995, p. 203).

Lee et al. (1999) established that there is a statistically significant relationship between the incidence of fraud and the difference between earnings and cash flows, with a model that correctly identified firms with a 10% probability of fraud in 73% of the cases tested. When the parameter for the probability of fraud was raised to 30%, the model correctly identified fraud firms in only 42.9% of the cases tested. The primary research question for Lee et al. was if the size of the difference in earnings and operating cash flow could be used as an indicator of financial statement fraud. The Lee et al. study followed the same social science experimental format as that used by Beneish (1999).

The experimental format used was a post-treatment test with a control group. Like Beneish (1999), Lee et al. (1999) blocked the control group by SIC codes and matched to their sample of firms identified in Securities and Exchange Commission Accounting and Auditing Enforcement Releases and the financial press as charged with violations of the fraud reporting provisions of the Securities Act of 1934. They used a model similar to Beneish's, with 14 variables included either as explanatory or as control factors, and an iterative holdout process to establish regression betas for each variable. Lee et al. then tested the variables from a sample of known fraud firms, where n = 56 fraud years, compared to a sample of non-fraud firms, where n = 18,830 non-fraud years. Their control group consisted not of a sample, but of an approximately 60 thousand firm database including essentially all public companies in the United States.

Lee et al. (1999) asserted their 73% accurate signal identifying firms with at least a 10% probability of financial statement fraud, as produced by the model constructed in the their study, was sufficiently strong for auditors and others at least to warrant heightened scrutiny, and awareness of the possibility of fraudulent financial reporting. Lee et al. reported that they had defined fraud firms narrowly, as those public companies identified in Securities and Exchange Commission Accounting and Auditing Enforcement Releases and the financial press as charged with violations of the fraud reporting provisions of the Securities Act of 1934 and that the model used included 14 variables. The measurements were straightforward, using the magnitude of the difference in reported earnings compared to operating cash flow as the primary explanatory variable. This is a proxy for or a measure roughly equivalent to total accruals. Lee et al., were careful to point out that the model was not robust and the indication of potential fraudulent financial reporting was ambiguous in that there were significant alternative earnings minus cash flows signal explanations.

Many other researchers in the accruals anomaly and fraud detection areas used large samples from the CompuStat database, and this has been questioned by several writers (Burton, 2007; Gomez-Bezares & Gomez-Bezares, 2006; Mazumder & Miller, 2005). Gomez-Bezares et al. suggested that the extensive use of these large-scale electronic databases was because the data were available. Use of the CompuStat database restricts data to public companies traded on the NASDAQ or other organized exchanges. The problem is that the data are restricted to public companies traded on the NASDAQ or other

organized exchanges. This limits the database to companies of some size and maturity large enough and stable enough to meet the listing requirements. Therefore, many small and medium-sized firms are excluded, and the results of studies making extensive use of the aggregated statistical information of the large commercial databases may not generalize well to the whole population of firms. Other theorists have noted that ex post calculation of numerous iterations of correlation incurs a risk of about 5% that correlation coefficients may be found significant simply by chance (Garson, 2008). Garson also discussed the reliability problems encountered because of the attenuation of the correlation coefficient when variance is truncated or restricted in a variable because of sampling that may truncate the range of variables, that is, by winsorizing.

Dechow et al. (1995), as researchers of the detection of earnings management, concentrated on misspecification of the models used by other major contributors to the field of inquiry. Various statistical inference models from the 1980s and 1990s, including the Jones (1991) and Dechow and Sloan (1991) models, attempted to disaggregate the non-cash portion of earnings into discretionary and non-discretionary segments, and to identify financial reporting fraud or earnings management and manipulation by the drivers and identifiers of excessive discretionary accruals. Dechow et al. (1995), found many such models were incorrectly specified in that the models they studied had identified test statistics that were correlated with earnings manipulation, but those test statistics were not causative factors. For instance, some researchers included incentive or stock-based compensation as a factor in their models. The idea that financial

reporting fraud is statistically related to executive compensation has been questioned by some researchers (Erickson, Hanlon, & Maydew, 2006) but affirmed by others (Dechow & Sloan, 1991).

Another main feature of the Dechow et al. (1995) research was its focus on the influence that errors in measuring discretionary accruals (caused by the inability of the outside observer correctly to segregate discretionary from nondiscretionary accruals) had in the results. That is, a correlation of earnings with nondiscretionary accruals, as opposed to discretionary accruals, can drive the researcher to Type I errors. These characterizations are set out in Table 1.

Table 1
Tabular Comparison of Quality Controls from the Literature

	Control objective		
Variable	Reliability	Internal validity	External validity
Dependent	Careful specification of relationships	Good content validity	Representative samples that generalize to the population well
Independent		Good content validity	Complementary X^2 tests to show samples all came from the same database
Extraneous	Winsorizing & indexing for comparability	Winsorizing & indexing for comparability	Employed samples matched by SIC codes
Confounding	Winsorizing & indexing for comparability	Defined sources of error in the model	

Misspecification as a flaw in financial research is discussed by Healy and Wahlen (1999) as well as Gomez-Bezares et al. (2006) and others (Aczel & Sounderpandian, 2006; Trochim, 2001). An example is found in the Lee et al. (1999) research. Lee et al., specified a multivariate model for the detection of

fraudulent financial reporting in which the dependent variable was the discovery of fraud, although it was fraud that drove changes in financial reporting.

Discovery of fraudulent financial reporting may be driven by factors outside the financial statements or the financial reporting process, and the discovery of fraud is not a causative factor in the changes in the relationship of cash flows to earnings, or in the absolute magnitude of the discretionary accruals total. The Lee et al. (1999) multivariate model defined the dependent variable as the discovery/non-discovery of fraud in the financial statements, and the main explanatory independent variable as earnings minus operating cash flows. Fraud caused the relationship between cash flows and earnings that Lee et al. measured, and not the reverse: the relationship between cash flows and earnings was not the cause of fraudulent financial reporting. It is axiomatic that a correct cause and effect relationship be recognized in a regression mode l(Aczel & Sounderpandian, 2006; Bulmer, 1979; Trochim, 2001; Zikmund, 2003). This flaw in the Lee et al. model or any other model based on a causal relationship may be significant (Gomez-Bezares & Gomez-Bezares, 2006; Healy & Wahlen, 1999). McNichols (2000) also cautioned against misspecification of the multivariate model and suggested that future progress in earnings management studies probably would not come from work based on aggregate accruals.

Summary

The literature of financial statement fraud detection and related areas can be summarized as consisting of four elements or categories of endeavor. Practitioner literature, the first category, includes assumptions about the

relationship of cash flows to earnings, and that a firm's failure to produce cash flows related to reported earnings is a warning or red flag for auditors, investors, regulators, and other users of financial reports that something is wrong with the reports (Albrecht et al., 2006; American Institute of Certified Public Accountants, 2002; Wells, 1997). Authoritative materials from the American Institute of Certified Public Accountants, the Public Company Accounting Oversight Board (2009), and Financial Accounting Standards Board (1987; Securities and Exchange Commission, 2003b) inform these assumptions by providing standards about how to detect fraud in financial reporting and how relevant financial statements are constructed,

The second subdivision of the academic literature of financial statement fraud detection includes descriptions of methods for detection of financial reporting fraud through traditional auditing techniques and fraud examination analyses methods. The Committee of Sponsoring Organizations analysis (Beasley et al., 1999) of the Securities and Exchange Commission's Auditing and Accounting Enforcement Releases, which summarized Securities and Exchange Commission investigations, including fraudulent financial reporting, is useful, as is much of the practitioner literature delineating the uses to which fundamental analysis may be put, relying on the basic relationships among the balance sheet, income statement, and statement of cash flows. Other useful material is found in the guidance provided to auditors by the American Institute of Certified Public Accountants and the Public Companies Accounting Oversight Board, including the red flags and heightened awareness of the possibility of financial statement

fraud from Statement of Auditing Standards 99 and risk assessment audit standards, Statements of Auditing Standards 104-111 (American Institute of Certified Public Accountants, 2002; Fogarty et al., 2006).

Third is a category of financial statement fraud literature made up of reports of research that investigated and documented the accruals anomaly. The accruals anomaly is a topic of much interest in the literature of finance. Investors appeared unable to distinguish between earnings primarily composed of accruals and earnings primarily composed of operating cash flows (J. Jones, 1991; Sloan, 1996). Dozens of articles have been published covering various facets of this subject. Very high accruals led to abnormal security prices (Cheng & Thomas, 2006); accruals with little persistence did not lead to security returns as high as those associated with more persistent accruals (Zach, 2003); Sarbanes-Oxley may have affected the quality of accruals (Cohen et al., 2008); the focus of the accounting rules applied affected the size of accruals, with income statement based rules resulting in higher accruals than the more conservative accruals based on balance sheet accounting rules (Dechow & Ge, 2006); investors could not distinguish discretionary accruals implying earnings management or fraud from non-discretionary accruals (Q. Liu & Qi, 2006), and so on. The import of this inability of investors to distinguish discretionary and non-discretionary accruals is a clear demonstration of the need for a way to identify fraudulent financial reporting because of the importance of accruals, discretionary or not, on investor returns from security prices based on reported earnings.

The models used in the various iterations of accruals anomaly research were relatively weak, and may have suffered from specification problems (McNichols, 2000; Thomas & Zhang, 2000). If accruals were relatively low, models returned only low rates of rejection of null hypotheses of no earnings management, but if accruals were high (extreme) models tested consistently rejected the no earnings management hypotheses (Dechow et al., 1995).

Two independently developed models were specifically designed to detect fraudulent financial reporting (Beneish, 1999; Lee et al., 1999). Financial statement reporting fraud was identified with statistically significant frequency, based on variables that included significant amounts of accruals in reported earnings or that were proxies for changes in working capital assets tantamount to cash flow to earnings comparisons. Both the Beneish and the Lee et al. works may have contained misspecification by inclusion of non-causative variables that may have produced orthogonal bias in the results. Bias may have been introduced into the data by the employment of the data smoothing techniques trimming and Winsorizing, and coding or indexing the variables to account for size differentials (Bollinger & Chandra, 2005; Duan, 1999; Jose & Winkler, 2008; McNichols, 2000).

CHAPTER 3: RESEARCH METHOD

Research Methods and Designs

Overview. The research included quasi-experimental static pre and post treatment tests, with control groups. The research was intended to build on the work of Beneish (1999), Lee et al. (1999), Dechow et al. (1995) and others to determine if changes in the cash flow ratio—the relationship of (a) cash from operating activities to (b) earnings from continuing operations—in the current period compared to previous periods may indicate the presence of fraudulent financial reporting. This information may be useful to auditors, regulators, investors, and others in detecting fraudulent financial statement reporting.

Restatement of the Problem and Purpose. The problem addressed is how auditors, regulators, investors, and other users of financial statements may detect fraudulent financial reporting. Financial statement fraud in the United States has been significant (Albrecht et al., 2006; Sessions, 1990; Wells, 1997). Because of financial statement fraud perpetrated by management, auditors may have rendered unqualified opinions on financial statements that did not conform in all material respects to generally accepted accounting principles (Albrecht et al., 2006; Arens et al., 2005; Knapp, 2006). Financial analysts and others depend on the availability of financial reports that are reliable and relevant for their purposes (Financial Accounting Standards Board, 1978), meaning free of material misstatement, whether caused by error or fraud. Decreasing cash flows from operations in the face of increasing reported earnings has been thought to be a strong indicator of fraudulent financial reporting (Albrecht et al., 2006; Arens

et al., 2005; Magrath & Weld, 2002; 2003a). This research was designed to examine if changes in the relationship between (a) cash flows from operating activities and (b) earnings from continuing operations, from one accounting period to another, may act as indicators of fraudulent financial reporting.

Statement of Auditing Standards No. 99, Consideration of Fraud in a Financial Audit (American Institute of Certified Public Accountants, 2002), indicated the failure to produce cash from reported earnings is a red flag for financial statement fraud. Moreover, some companies may have engaged in complicated financial activities to mask the failure of the firm to produce operating cash flows appropriately related to reported earnings (Magrath & Weld, 2002; Securities and Exchange Commission, 2003a). With a current year magnitude estimated more than $900 billion (Association of Certified Fraud Examiners, 2008), financial statement fraud has been a significant problem in the United States (Albrecht et al., 2006; Federal Bureau of Investigation, 2007; Lindsay et al., 2004). Financial analysts, auditors, regulators, and others depend on financial reports that are free of material misstatement, whether caused by error or fraud, that is, reliable and relevant for their purposes (Keating & Frumkin, 2003).

The Financial Accounting Standards Board acknowledged the need for reliable and relevant financial reporting, and has worked toward reducing complexity and increasing usefulness to improve financial reporting (Financial Accounting Standards Board, 2007). Financial reporting fraud risk management is part of the enterprise risk management framework produced by the Committee

of Sponsoring Organizations of the Treadway Commission (PricewaterhouseCoopers, 2004). This risk management framework expanded on the Committee of Sponsoring Organizations' integrated framework for internal control, the foundation internal control document for US public companies. The risk management document subsumed and incorporated internal control, including the risks of fraud, as part of a larger framework of enterprise risk management.

Business practitioners and academics have assumed there is a direct proportional causal relationship between the components of the cash flow ratio (the ratio of (a) cash flows from operating activity and (b) earnings of a business from operations) (Albrecht et al., 2006; Magrath & Weld, 2002; Nikolai et al., 2010). Whether a cash payment is before, during or after a sales transaction is recorded, eventually the sale must either become cash in the form of a cash receipt, or as a reduction in a cash outflow. Knowledgeable users of financial statements, including auditors, have assumed the circumstances that created conditions in which businesses reported increasing earnings from continuing operations together with decreasing related cash flows from operating activities, or in which the magnitude of the difference between cash flows from operating activities and earnings from continuing operations was large, often included fraudulent financial reporting (American Institute of Certified Public Accountants, 2002; Public Company Accounting Oversight Board, 2004). Moreover, it has been suggested that a substantive change, over time, in the relationship of cash

flows to net income may reflect on the quality of the earnings (Palepu & Healy, 2008).

The research for this dissertation was important to many in industry, government, and the academic community. The research was designed to build on the research of Beneish (1999) and Lee et al. (1999), and the accruals anomaly research currently debated in the academic literature, including multivariate-model fraud detection research by Beneish (1999), Lee et al.(1999), the practitioner literature of fraud detection and auditing, and the accruals anomaly literature of researchers including Cheng and Thomas (2006), Cotton (2005), Dechow and Ge (2006), Desai, Rajgopal, and Venkatachalam (2004), Fairfield (2006), Pincus, Rajgopal, and Venkatachal (2007), Sloan (1996), Zach (2003), and Zhang (2007), and was intended to help users identify the incidence of fraudulent financial reporting from the evidence of the financial statements.

Research Questions. The central premise of the research was to examine the extent to which analysis of the cash flow ratio, that is, the ratio of (a) cash flows from operating activities to (b) earnings from continuing operations, in a given accounting period and as the ratio changes from period to period, may have been used to detect financial reporting fraud. This dependent variable was chosen for the focus of the research in part because of its simplicity: a simple measure may become a more practical tool for stakeholder users of financial statements. The first research question was to establish the correlational relationship between the two components of the dependent variable, (a) cash flows from operating activity and (b) earnings from continuing operations. This

step, using correlation as a descriptive statistic, has often been the predicate for subsequent studies using inferential statistics, and included a calculation of the significance of the correlation (Trochim, 2001). The cause and effect relationship of earnings to cash flows has been established as a logical conclusion based on knowledge of double entry accounting (Dechow et al., 1998), and was established statistically here to provide internal validity. If the relationship between (a) cash flows from operating activity and (b) earnings from continuing operations was not correlational, measures of the change in their ratios in the subsequent research questions may have lacked validity. The observation of correlation between variables does not show causation, but the fact of the correlation was a requirement for causation to exist (Tufte, 2003).

The second research question was intended to identify if the cash flow ratio was different for fraud firms compared to a control group of non-fraud firms. The final research question was intended to assess if the cash flow ratio was different for fraud firms before and after the identification of financial statement reporting fraud. The answers to these questions were important to investors, managers, regulators, academics, and the professionals in accounting and fraud examination. The research was built on current subjects from the literature of accounting, fraud examination, and finance, and may help users identify fraudulent financial reporting from the evidence of company financial statements.

Q1: To what extent, if any, is there a correlation between (a) cash flows from operating activities and (b) earnings from continuing operations?

Q2: To what extent, if any, is the cash flow ratio (the ratio between (a) cash flows from operating activities and (b) earnings from continuing operations) different for firms with detected financial reporting fraud compared to firms without detected financial reporting fraud?

Q3: To what extent, if any, is there a change in the cash flow ratio (the ratio from (a) cash flow from operating activities to (b) earnings from continuing operations), for fraud firms before and after the identification of fraudulent financial reporting?

Where company type indicated the presence of financial reporting fraud, the absence of, or change in cash flows from operating activities was the central phenomena documented by this study. The efficacy of measuring changes in the cash flow ratio to detect fraudulent financial reporting was postulated for this research. In research questions 2 and 3, detected financial reporting fraud was the independent variable. The use of the cash flow ratio (the dependent variable) as the ratio was changed by the treatment compared to a control group and as changed for fraud firms before and after identification of the fraud, as opposed to a simple view of the magnitude of the difference in earnings and cash flows at a point, together with the parsimonious nature of the model focused on these observations, was intended to distinguish this work from prior studies.

Hypotheses. Null and alternate hypotheses $H1_0$ and $H1_a$ flowed from research question 1. Hypotheses $H2_0$, $H2_a$, $H3_0$, and $H3_a$ flowed from research questions 2 and 3.

$H1_0$: There is no correlation between (a) cash flows from operating activities and *(b)* earnings from continuing operations for firms across the data.

$H1_a$: There is a correlation between (a) cash flows from operating activities and *(b)* earnings from continuing operations for firms across the data.

$H2_0$: There is no difference in the cash flow ratio for firms with identified financial reporting fraud compared to firms without identified financial reporting fraud.

$H2_a$: There is a difference in the cash flow ratio for firms with identified financial reporting fraud compared to firms without identified financial reporting fraud.

$H3_0$: There is no change in the cash flow ratio for fraud firms before and after the identification of fraudulent financial reporting.

$H3_a$: There is a change in the cash flow ratio for fraud firms before and after the identification of fraudulent financial reporting.

Study Designs. Correlation analysis—calculating Pearson's *r*— was used to determine the strength of correlation between cash flows from operating activities and earnings from continuing operations, for firms without detected financial statement reporting fraud and for firms with detected financial statement reporting fraud. Second, a quasi-experimental static design including pre and post treatment analysis, with randomized and blocked data was used to test if the cash flow ratio was different for a treatment group of firms with identified financial statement reporting fraud versus a control group without identified financial statement reporting fraud using *t*-tests comparing means. The design was a

quasi-experimental design because the control group could not be tested pre and post treatment (before and after fraud identification) as there was no identified financial statement reporting fraud in the control group. Third, a design without a control group was used to determine if the means of the cash flow ratios were different for firms with identified financial statement reporting fraud before and after the identification of the fraud. This calculation was also done using a *t*-test comparing means.

The first design was appropriate because it allowed the intuitional predicate of the study, confirmed by Dechow (1998), that there was a close relationship between (a) cash flow from operating activities and (b) earnings from continuing operations (the cash flow ratio), to be established as a statistical fact. This was a necessary predicate for studying changes in the cash flow ratio induced by fraudulent financial reporting. The components of the cash flow ratio were causally related, based on intuition drawn from knowledge of accounting. If the two components of the cash flow ratio were not statistically related, studying the ratio would not produce meaningful results.

The second and third designs were appropriate because they helped control bias and other threats to internal validity, given the available data, in the testing of the null hypotheses of no difference in the dependent variable (the cash flow ratio) based on the treatment, fraudulent financial reporting. The second and third designs, including their research questions and related null and alternative hypotheses constituted the central focus of this study.

All data used were after the fact, secondary data. To enhance external validity the second design was implemented to provide a control group for comparison and a test group for which the independent variable was invoked through the selection of test units. The third design was appropriate because it helped establish external validity by confining the observations to firms with identified financial statement reporting fraud and observing the change in the ratio of cash flow from operating activity to earnings from continuing operations, pre and post fraud identification. Because of limitations in the data in which post identification data were not available for all years for all firms identified in the fraud group, and some data were not available for pre-identification years for some firms that had post-identification data, the samples for the third design were independent, and the design was set to test the difference in the means of the cash ratios of the pre and post fraud identification on that basis. Additionally, the third test design was invoked twice, with the iteration using a matched pairs sample in the repeated measures fashion. The second iteration sample was made by culling the non-matched pre and post identification firms from the sample used for the first iteration of the third design.

Participants

The research did not use live human or animal subjects. All data used in the studies were obtained from publically available secondary sources including Mergent Online (Mergent Online, 2009), the Securities and Exchange Commission database of Accounting and Auditing Enforcement Releases (2009a), and Internet press reports. The companies in the control sample

represented 90 different 4-digits SIC groups. In the fraud samples, 115 and 121 SIC groups were represented. The companies in the fraud groups averaged between $11 billion and $14 billion in total assets and averaged $4 billion to $6 billion in annual sales. The control group companies averaged about $87 billion in assets and $28 billion in average sales revenue. All of the firms' securities were registered with the Securities and Exchange Commission and were publicly traded. All of the firms in the control group were listed on the New York Stock Exchange (NYSE). The securities of firms in the fraud samples were traded on the NASDAQ (the National Association of Securities Dealers Automated Quote system), the NYSE, or other exchanges.

Material/Instruments

Data were downloaded to Microsoft Office Excel 2007, version 12.0.6524.5003, with SP@ MSO (12/0.6452.1000), licensed to Henry ("Rod") Elrod (standard spreadsheet software) from the Mergent Online (1998) financial database of U.S. and foreign issuers registered with the Securities and Exchange Commission. The data were organized in a columnar fashion, and stored for subsequent analysis and study. No instruments or other similar materials were used in the research.

Operational Definition of Variables

For all hypotheses, X_1 and Y_1 were defined as follows: X_1, the independent variable, was a dichotomous variable indicating whether fraudulent financial reporting had been identified or not; Y_1, the dependent variable, was a ratio computed as (a) cash flows from operating activities divided by (b) earnings

from continuing operations. Company type meant companies with fraud or those without detected financial reporting fraud.

Fraud (X_1). Fraud was the independent dichotomous nominal variable indicating if financial statement reporting fraud had been identified. Financial statement reporting fraud was operationally limited, where possible, to fictitious, surreptitious, or clandestine entries in the sales, receivables, payables, and related working capital accounts normally associated with cash flows from operating activities. Only firms in the Government Accountability Office restatement database (2007) with financial statement reporting fraud, identified by examination of relevant company press releases, Securities and Exchange Commission Accounting and Auditing Enforcement Releases, and other announcements in the press and electronic media were selected as the fraud sample.

Firms in the database with unintentional errors causing restatement and other types of financial statement fraud (not involving sales, receivables, payables, and related working capital accounts normally associated with cash flows from operating activities) were culled by examination of relevant company press releases, Accounting and Auditing Enforcement Releases, and other announcements in the press and electronic media, as part of the process of selection of the fraud group. The Securities and Exchange Commission selects firms to prosecute based on size, severity of the apparent offense, and other criteria, so Accounting and Auditing Enforcement Releases alone do not provide a sufficient database of firms with identified financial reporting fraud.

Cash flow ratio (Y_1). The dependent variable was the ratio of (a) cash flows from operating activities (in dollars to the nearest thousand) divided by (b) earnings from continuing operations (also in dollars to the nearest thousand.) Changes in the dependent variable by company type were tested by comparing means using *t*-tests.

Cash flow from operating activities was defined operationally as earnings from continuing operations minus current period changes in working capital assets, plus current period changes in working capital liabilities, plus depreciation and amortization, and minus gains (losses) from the disposition of assets that were included in ordinary income (Nikolai et al., 2010).

Earnings from continuing operations was defined operationally as net income minus extraordinary items and minus results from discontinued operations (Nikolai et al., 2010).

Calculated minimum sample sizes for the means comparisons, given the finite population of firms in the GAO database of 2,309, and controlling the smallest effect size by setting Cohen's *d* to .2 limited the sample size necessary for the comparison of independent means tests to 812 test units in two samples of 475 and 337 units (Faul et al., 2007; Hopkins, 2008; Kelley, 2005). The level of significance was set at .05, and the desired power of the tests was set at an 80% probability (*beta* set at .2) of identifying fraud/restatement without a Type II error.

Data Collection, Processing, and Analysis

This research used no human subjects, and all data were secondary, collected from public sources available on the Internet. Financial data were

collected from the Mergent Online (2009) database. Information about the nature, timing, and extent of financial statement reporting fraud for firms in the fraud group was collected from publicly available Internet sources, including the Securities and Exchange Commission's database of public company filings (2008; 2009a) and Accounting and Auditing Enforcement Releases, and companies' press releases and website information. Data collection forms were not used, as the data were downloaded or keyed directly to Excel worksheets for further summarization and analysis. All calculations and data processing, other than vetting the categorization of firms to the fraudulent financial reporting group, were made in Excel.

Fraud group firms were selected at random from a database (United States Government Accountability Office, 2007) of firms that restated their financial statements, from which firms included for reasons other than financial statement fraud involving fictitious sales or accounts receivable were culled. The database was prepared by the United States Government Accountability Office (GAO) as part of a report to congress mandated by the Sarbanes-Oxley Act of 2002 (Agostino, 2003). The database is a series of three reports in the form of letters to the appropriate Congressional committees, from the GAO. This material was not published by the Government Printing Office but has been available on the GAO website. It covers firms that restated their financial reports for the prescribed years, which are within the jurisdiction of the Securities and Exchange Commission. Control group firms were selected at random from New York Stock

Exchange listed firms. Firms for investigating the first research question were selected at random from New York Stock Exchange listed firms.

This section describes the steps taken to carry out the study. Three statistical tests were conducted. The data sets for the null and alternative hypotheses, $H1_0$ and $H1_a$, to determine the coefficient of correlation of the two components of the cash flow ratio were the same control group and fraud group sample data to be selected for testing of hypotheses $H2_0$, $H2_a$, $H3_0$, and $H3_a$, The first test was to demonstrate the strength of the correlation between the components of the cash flow ratio, (a) cash flow from operating activities and (b) earnings from continuing operations, to confirm statistically the intuition based on an understanding of accrual accounting that the two are closely related, both for firms with and without detected financial statement reporting fraud. The *t*-tests of the differences in the means of the treatment and control groups ($H2_0$ and $H2_a$) and the treatment group before and after identification of fraud ($H3_0$, and $H3_a$) were for statistical significance of the differences.

Restatement/fraud group data. The 2,309 member list of companies in the restatement population in GAO-06-678 (2007) were listed in the database in the chronological order in which the restatements occurred. Entries for 1,320 firms contained descriptive information about the nature of the reporting fraud or accounting error involved and among these, 779 were described as resulting from revenue or expense reporting errors or fraud. To avoid examining all 2,309 firms in the database, firm data units were chosen at random from the database. Firm data units for which the presence of the appropriate type of financial

statement reporting fraud could not be confirmed through Accounting and Auditing Enforcement Releases, press coverage or company publication were culled and replaced by the next unit, as random units were vetted. To make the random selection, arbitrary numbers were assigned for the earliest through the latest dated entries, and random numbers generated for the test units. Samples for each planned treatment were picked taking the random items in the random order, with substitutions made for test units for which appropriate data were not available (Trochim, 2001). After selection, the financial data for both the fraud restatement group and the non-fraud control group, selected from a random sample of firms from the New York Stock Exchange, were gathered manually from Mergent Online (2009), for research question 2. The before fraud period data for the before and after fraud group in research question 3 also were gathered manually via Internet access to Mergent Online. All data were stored in Microsoft Excel spreadsheet format for summarization, description, and analysis.

Control group data. The control group companies were selected by similar procedures, using a random sample of the firms listed on the New York Stock Exchange. Data were gathered by a process similar to that described for the fraud/restatement data, from the Mergent Online (2009) database.

Discussion of Data Processing. The data processing for the research was straightforward and relatively simple. Data were downloaded from the Mergent Online (2009) database, available through many public and university libraries. Excel spreadsheet templates, formatted for visual consistency and readability, were used for statistical computations.

Hypothesis testing. To establish the predicate for subsequent tests, the test for $H1_0$ and $H1_a$, was correlation analysis—calculating Pearson's *r*—to determine the strength of the correlation between the components of the cash flow ratio (a) cash flows from operating activities and (b) earnings from continuing operations, for firms without detected financial statement reporting fraud and for firms with detected financial statement reporting fraud. For the null and alternative hypotheses flowing from research questions 2 and 3 ($H2_0$, $H2_a$, $H3_0$, *and* $H3_a$), *t*-tests were used to compare sample means of the cash ratios in samples with and without identified fraud, and in samples before and after identified fraud.

Data items. The following items of data were collected for each company: (a) name, (b) stock symbol, and (c) SIC number. Additionally, for the 3 years before and including the restatement year, and the two years following the restatement, (a) total assets, (b) net revenue, (c) depreciation, (d) amortization, (e) income from continuing operations, and (f) cash flow from operating activities were collected.

Data integrity. To ensure accuracy and data integrity, both data group samples were tested by selection of companies on a random basis, and their data variables were verified. To verify the accuracy of keying and downloading from the Mergent Online (2009) database, data in the Excel worksheets used for the statistical calculations were checked, on a test basis, against data in the Mergent database. Any errors found were corrected or test units were replaced. Where appropriate, double keying was used as a control technique. Two random

samples of 30 data items each were checked against the source. One immaterial error was discovered and corrected, and the error rate was deemed acceptable.

Blocking, to reduce the noise or variance that arises because of differences in subgroups in the data, can be accomplished by conducting analysis with data stratified into relatively homogeneous groups (Trochim, 2001). For before and after tests of the change in the fraud group means of the cash flow ratio, for research question 3, test units were companies before and after restatement, so the effect of a blocking scheme was invoked without the step of sorting by SIC numbers. The *t*-tests for this research question were conducted twice. The before and after restatement samples used in the first iteration did not include a requirement for matched pairs, and the samples were independent. That is, although the before restatement group contained fraud firms before the identification of the fraud and resulting restatement (n = 594), and the after restatement group contained firms after the identification of fraud and resulting restatement (n = 345), the two samples did not necessarily contain matched pairs; a given firm could be in one sample and not in the other. Accordingly, although the test was with before and after type data, the samples were independent and it was not a repeated measures/matched pairs type test. To improve the blocking power of the before and after test, the samples were then culled of non-matched firms and the resulting before and after fraud identification and resulting restatement sample (N = 179) was tested as a repeated measures/matched pairs test.

Because the relationship of cash flows from operating activities and earnings from continuing operations in this research was a ratio, scaling by lagged assets or other means was not necessary. Total assets would include the effects of the working capital accounts affected by fraudulent manipulation of revenues and expense. By not scaling with total assets, any potentially orthogonal effects found in the works cited in this research (Beneish, 1999; Dechow & Ge, 2006; Dechow et al., 1995; Erickson et al., 2006; Lee et al., 1999) should have been avoided.

Although over-specification of a model may help to ensure needed terms are present, models that are over-fitted or have too many variables for estimation periods can result in overstated explanatory power (McNichols, 2000; Trochim, 2001). Invoking Ockham's razor, a parsimonious univariate model was utilized to examine fraud-induced changes in the cash flow ratio. Rather than attempting to construct a comprehensive multivariate regression model intended to detect fraud by comparison to industry and market averages for the explanatory statistics, this research was intended to produce a signal from a company's own earnings and cash flow data that would be usable to auditors, investors, lenders, regulators, and other interested stakeholders in detecting fraud.

To control for outliers that may have produced extreme statistical results, some researchers smoothed their data by Winsorizing, truncating, or trimming data points far outside the norm (Duan, 1999). With normal data and two-tailed tests, this has been done frequently at the 1% and 99% extremes (Beneish, 1999; Dechow & Ge, 2006; Erickson et al., 2006; Hribar & Nichols, 2007).To

avoid the risk of introducing bias, techniques such as Winsorizing, truncating, trimming, smoothing or manipulating the data to reduce the effect of outliers were not employed in this research. Such techniques might have exacerbated regression toward the mean, and may have attenuated and understated correlation (Bollinger & Chandra, 2005; Zikmund, 2003).

In data unit cases for which the signs of the components of the Y_1 statistic (the cash flow ratio) were not the same, the statistic was a signed number, skewing the means for the test groups and making measurement of the size of the change in the statistic problematical. A simple example may clarify this. Posit two fraud firms with the following data before restatement: cash flow from operating activity for firm one is 5 and for firm two it is 3. Earnings from continuing operations before restatement are 4 and 2 respectively. Both have recorded fictitious revenue of 3. The Y_1 statistic for firm one therefore is 1.25 (Y_1 = 5/4), and for firm two it is 1.5 (Y_1 = 3/2). After restatement, firm one reports cash flow of 5 and earnings of 1, making Y_1 equal 5.0 (5/1). After restatement, firm two reports cash flow of 3 and earnings of -1, yielding Y_1 of -3 (Y_1 = 3/-1). For firm one the statistic increased to 5.0 from 1.25, a positive change in Y_1 of 3.75 points. For firm two the statistic changed to -3 from 1.5, a negative change in Y_1 of -4.5 points. Although the magnitude and direction of the change in reported earnings was the same for both firms, because of the change in the sign of the earnings number for firm two, the Y_1 statistic changed anomalously by a different size of change and a different direction of change. The result of this

statistical anomaly was that conclusions based on observation of the relative sizes of the cash ratios of sample firms were not meaningful.

Methodological Assumptions, Limitations, and Delimitations

From an accounting perspective, all of the companies in the fraud samples and the control group were assumed to have followed homogeneous principles, assumptions and conventions in the preparation of their financial statements, with two theoretical exceptions. The data were assumed to be homogeneous because they were all prepared under United States' generally accepted accounting principles, as required for registration of securities that enable the firms to be traded on public exchanges such as the New York Stock Exchange, and as promulgated by the Financial Accounting Standards Board (Securities and Exchange Commission, 2003b). Firms in the databases that prepared their financial reports in accordance with International Financial Reporting Standards or some other comprehensive standards other than generally accepted accounting principles were excluded from the samples during the data selection process.

The two exceptions to the homogeneous data assumption were that the firms in the fraud groups departed from generally accepted accounting principles by definition: they published financial statements that were not fairly stated in all material respects because they contained some fraudulent financial information. Additionally, firms that engaged in fraudulent financial reporting may have attempted to mask their activities. Firms engaged in fraudulent reporting activities that would normally have shown a discrepancy in the expected relationship

between earnings from continuing operations and cash flows from operating activities may have also engaged in schemes to manipulate reported cash flows in order to mask the fraudulent activity (Magrath & Weld, 2002; Securities and Exchange Commission, 2003a; Siegel, 2006). The observation about masking activities was critical to the research, as it introduced and identified a source of error in the databases. It is understood that the financial statements in the known fraud firms group have been manipulated by the fraudulent activity, as well as by the attempt to cover the fraudulent activity, but the Securities and Exchange Commission comments confirm the suspicion that some financial statements in the non-fraud group may also have been manipulated, masking undiscovered fraud.

In this research statistical inference was applied to an unfair data set, in that statistical inference techniques were applied to data that, for the fraud sample, were known to be fraudulent (Magrath & Weld, 2002). Because the data contained fraud, an inherent limitation in the ability to clarify the relationship of cash flows from operating activities and earnings from continuing operations existed. The limitation did not result from incomplete or inaccurate data collection or procedures, but was inherent in the data set. The fraud group data were flawed by definition, and use of such data may have produced unexpected results. Additionally, internal validity may have been reduced by the effects of companies in the data for which management masked the effects of the fraudulent activities, resulting in possible incorrect characterization as non-fraud companies. The data from the non-fraud group were tainted to the extent

undiscovered financial statement reporting fraud existed in the general population.

Despite the precision of statistical analysis, in which error rates are known, statistical analyses can be no better than the data that are used. In financial reporting, management makes many significant estimates, and the financial statement numbers are the result of rounding and summarization (Financial Accounting Standards Board, 1978; Nikolai et al., 2010). Financial statements by their nature are not precise measures. The accounting control systems that are used vary in quality and are designed to provide only reasonably cost-effective assurance that the financial statements are fairly stated in all material respects, and financial statements therefore are not accurate or precise in the general sense in which such terms are usually viewed (Arens et al., 2005; Committee of Sponsoring Organizations, 1985). Statistical analyses based on financial statement data frequently imply more accuracy than may be present in the underlying data (Kanodia, Singh, & Spero, 2005).

The research was specifically limited to the use of the parsimonious single-variable model incorporating the author's construct, the cash ratio, rather than the multivariate models used by others such as Beneish (1999) or Lee et al. (1999), as noted in the literature. This choice was made to address perceived problems in the multivariate model studies including orthogonal bias, the potential for variable specification with terms that were not causative agents, and to avoid overstating explanatory power of excess variables (McNichols, 2000).

Significant in the design choice of purposeful restriction of the model to a single independent variable and a single dependent variable was the choice of independent variable the cash flow ratio (also called the cash ratio). The independent variable, fraud, was the identification of the particular type of financial statement reporting fraud that can be expected to produce a change in the cash flow ratio. The cash flow ratio, the dependent variable, was the ratio of (a) cash flows from operating activities to (b) earnings from continuing operations for a given accounting period.

The test designs were further restricted by the intentional avoidance of (a) scaling the data (for size) to avoid orthogonal effects (Dechow et al., 1995), and (b) data trimming, Winsorizing, or other cleaning of the data, which can introduce bias and attenuate measurements of correlation (Bollinger & Chandra, 2005; Duan, 1999). Fraud firms were selected by a random process from a database prepared by the Government Accountability Office (2007), and their counterpart non-fraud firms were selected by a similar random process. Where appropriate, blocking schemes to reduce noise and bias from industry group characteristics (Trochim, 2001) were employed. As Type II errors were more important to the users of financial statements that may contain fraud, the power levels of the *t*-tests for the differences in the means of the cash flow ratios for the various samples were set at 80%, with Cohen's *d* set at .2 to ensure adequate effect size (Hopkins, 2008). The risk of Type I errors was set at .05.

Ethical Assurances

No human or animal subjects were used in the study. All data for this research came from publicly available databases, so no implied rights of subjects to privacy, confidentiality, or anonymity existed. There can be no deception of subjects in data collection using secondary data from public sources. On August 12, 2009, in response to application made on August 8, 2009 and prior to any data collection for this research, the Northcentral University Institutional Research Board (IRB) indicated that as the research design involved only secondary data from data sources available to the public, the research was classified as exempt from IRB review (S. Alamillo, personal communication, August 12, 2009, via email forwarded to the author from W. McKibbin).

Summary

Intended to build on the work of Beneish (1999), Lee et al. (1999), and Dechow et al., (1995), and to fill a gap in the financial and accounting literature dealing with the detection of fraudulent financial reporting, this research examined if changes in cash flow ratios indicated fraud in financial reports. The problem of detection of fraud by auditors, regulators, investors, and other users of financial statements is significant (Albrecht et al., 2006; Sessions, 1990; Wells, 1997). The users of financial statements rely on financial statements free of material misstatement from error or fraud (Financial Accounting Standards Board, 1978). Decreasing cash flows from operating activities compared to increasing reported earnings has been considered an indicator of such financial reporting fraud (Albrecht et al., 2006; Arens et al., 2005; Magrath & Weld, 2002).

The research was important and was designed to build on the research of Beneish (1999) and Lee et al. (1999), and the accruals anomaly research currently debated in the academic literature, including multivariate-model fraud detection research by Beneish (1999), Lee et al.(1999), the practitioner literature of fraud detection and auditing, and the accruals anomaly literature of researchers including Cheng and Thomas (2006), Cotton (2005), Dechow and Ge (2006), Desai, Rajgopal, and Venkatachalam (2004), Fairfield (2006), Pincus, Rajgopal, and Venkatachal (2007), Sloan (1996), Zach (2003), and Zhang (2007), and was intended to help users identify the incidence of fraudulent financial reporting from the evidence of the financial statements.

The first research question was predicated on the intuitional understanding of those familiar with double-entry accrual accounting, that there was a causal relationship between earnings from continuing operations and cash flows from operating activities, as confirmed by Dechow (1998). These two financial statement elements were the components of the cash flow ratio, as defined here. The question, what was the extent of the correlation between the two, was a predicate for further studies (Trochim, 2001) and was a requirement for a causal relationship to exist (Tufte, 2003). The second research question was if there was a difference in the means of the cash flow ratios for companies with detected financial reporting fraud, versus companies without detected financial reporting fraud. The third research question was if there was a difference in the means of the cash flow ratios for companies with detected financial statement reporting fraud, before the detection of the fraud versus after

the fraud is detected. These questions were answered by conducting statistical tests of null hypotheses that flowed logically from them. For the first, Pearson's *r* indicated the extent of correlation of the components of the cash flow ratio. For the second and third, *t*-tests of the means of the groups of sample companies indicated if any differences were significant.

The data used in these studies came from publicly available secondary sources. There were no human subjects. The study designs included protocols to ensure data were accurately collected. The calculations involved in the three tests were relatively simple, and were conducted in Excel spreadsheets.

Significant in the design of the studies was the purposeful restriction of the model to a single independent variable and a single dependent variable. The independent variable, fraud, was the detection of the particular type of financial statement reporting fraud that can be expected to produce a change in the cash ratio. The cash flow ratio, the dependent variable, was the ratio of (a) cash flows from operating activities to (b) earnings from continuing operations for a given accounting period.

The use of the parsimonious univariate design avoided overstating explanatory power of excess variables (McNichols, 2000). The test designs were further restricted by the intentional avoidance of (a) scaling the data (for size) to avoid orthogonal effects (Dechow et al., 1995), and (b) data trimming, Winsorizing, or other cleaning of the data, which can introduce bias and attenuate measurements of correlation (Bollinger & Chandra, 2005; Duan, 1999). Fraud firms were selected by a random process from a database prepared by the

Government Accountability Office (2007), and their counterpart non-fraud firms were selected by a similar random process. Where appropriate, blocking schemes to reduce noise and bias from industry group characteristics (Trochim, 2001) were employed. As Type II errors were more important to the users of financial statements that may contain fraud, the power levels of the *t*-tests for the differences in the means of the cash flow ratios for the various samples were set at 80%, with Cohen's *d* set at .2 to ensure adequate effect size (Hopkins, 2008). The risk of Type I errors was set at .05.

CHAPTER 4: FINDINGS

The purposes of this quantitative study first were to determine to what extent, if any, was there a correlation between (a) current period cash flows from operating activities and (b) current period earnings from continuing operations. Second, the purpose was to determine the extent, if any, that the ratio between (a) cash flows from operating activities and (b) earnings from continuing operations (the cash ratio) was different for firms with detected financial reporting fraud compared to firms without detected financial reporting fraud. Third, the purpose of the research was to determine the extent, if any that there was a change in the cash flow ratios for fraud firms before and after the identification of fraudulent financial reporting.

This chapter presents the information developed by the study planned and conducted for this dissertation. Accordingly, following the format of the research questions and hypotheses, the chapter includes without discussion the quantitative descriptive information, statistics and conclusions as to statistical significance resulting from the tests conducted in the research study. The chapter is organized into three sections. First, in the results section, descriptive statistics and a review of the conduct of the study are presented, together with the results of the statistical tests. Second, the results section is followed by a section for evaluation of findings, and finally there is a chapter summary.

The problem addressed was how auditors, regulators, investors, and other users of financial statements might detect fraudulent financial reporting. Central to the research was examination of the extent to which analysis of the ratio of (a)

cash flows from operating activities to (b) earnings from continuing operations, in a given accounting period and as the ratio changes from period to period (herein the cash ratio), might be used to detect financial reporting fraud. The cash ratio construct was posited as a causal relationship connecting earnings from continuing operations to cash flow from operating activity. The research was important to many in industry, government, and the academic community. The research was built on subjects currently debated in the financial and accounting academic literature, including multivariate-model fraud detection research by Beneish (1999), Lee et al.(1999), the practitioner literature of fraud detection and auditing, and the accruals anomaly literature of researchers including Cheng and Thomas (2006), Cotton (2005), Dechow and Ge (2006), Desai, Rajgopal, and Venkatachalam (2004), Fairfield (2006), Pincus, Rajgopal, and Venkatachal (2007), Sloan (1996), Zach (2003), and Zhang (2007), and was intended to help users identify the incidence of fraudulent financial reporting from the evidence of the financial statements.

Results

Three fundamental research questions were posed. First, to what extent, if any, was there a correlation between (a) current period cash flows from operating activities and (b) current period earnings from continuing operations? This question was included to establish statistically the intuitional inference drawn from knowledge of accounting that there is a directly proportional relationship between earnings from continuing operations and cash flows from operating activities. The second research question was to what extent, if any, was the cash

flow ratio different for firms with detected financial reporting fraud compared to firms without detected financial reporting fraud? The third research question was to what extent, if any, was there a change in the cash flow ratio for fraud firms before and after the identification of fraudulent financial reporting?

Overview. Three statistical tests were conducted. The data sets for null and alternative hypotheses $H1_0$, and $H1_a$, to determine the coefficient of correlation of the two components of the cash flow ratio (research question 1), were the same control group and fraud group sample data selected for testing of hypotheses $H2_0$, $H2_a$, $H3_0$, and $H3_a$. The first test was to demonstrate the strength of the correlation between the components of the cash flow ratio, (a) cash flow from operating activities and (b) earnings from continuing operations, to confirm statistically the intuition based on the understanding of accrual accounting, that the two are closely related, both for firms with and without detected financial statement reporting fraud.

Differences in the means of treatment and control groups for $H2_0$ and $H2_a$ (research question 2), were measured with *t*-tests using a random control group and a treatment group of firms identified in the Government Accountability Office (2007) database as having restated their earnings. The firms in the control group were vetted, by reviewing information in the press and regulatory filings with the Securities and Exchange Commission, as having restated because of financial statement reporting fraud.

Tests of the differences in the means of the cash ratios of firms before and after identification of fraud ($H3_0$ and $H3_a$) were conducted using *t*-tests to

calculate the statistical significance of the differences. These tests were conducted twice, once using the same data set for the before detection fraud group as was used for the $H2_0$ and $H2_a$ test, and the second time using matched pair samples for which sample 1 was fraud firms for the last year before restatement, and sample 2 was the same 179 firms in the first year after restatement. Thus, in the matched pair-blocking scheme, each firm was represented only 2 times in the samples: once in the last year before restatement and once for the first year after restatement. Because the samples were independent, the first iteration of the t-test for research question 3 was run as a difference in means test with unequal variances. The second iteration, with the matched pairs before/after sample was run as a repeated measures test.

Sample selections. To make the random selections for the samples, arbitrary numbers were assigned for the earliest through the latest dated entries in the Government Accountability Office (2007) database, and unique random numbers were generated for the test units. The sample units for the planned treatment, the fraud group, were drawn taking the random items in the random order, with substitutions made for test units for which appropriate data were not available (Trochim, 2001), after sorting the database and culling firms whose restatement reasons were identified and clearly did not involve fraud or the revenue or receivable accounts. Sample units for the control group were drawn by a similar random process from firms listed on the New York Stock Exchange and not listed in the Government Accountability Office restatement database. The control group sample was culled to eliminate firms reporting in International

Financial Reporting Standards, mutual funds, exchange traded funds, and the like. After selection, financial data for both the fraud restatement group and the non-fraud control group were gathered manually from Mergent Online (2009). Data items gathered for the sample firms were (a) 4-digit SIC numbers, (b) exchange trading symbols, (c) total assets, (d) total net revenue, (e) income from continuing operations, (f) depreciation and amortization, and (g) cash flow from operating activities. All data were stored in Microsoft Excel spreadsheet format for summarization, description, and analysis.

Sample descriptions. As measured by total assets or total net revenue, the sizes of the firms in the control group appear to be different from the comparatively similar magnitudes of the firms in the fraud groups before and after restatement (see Table 2). The ranges of the values for assets and revenues together with category standard deviations are shown in Table 2. By inspection of the standard deviation data in Table 2, the observation can be made that the range of the data for the treatment groups does not appear to be as large as the range of the data represented in the control group

Table 2

Sample Descriptive Statistics

	Fraud group before restatement	Fraud group after restatement	Control group
Means:			
Total assets	11,818,879	13,773,498	86,834,273
Net revenue	4,192,430	5,139,888	28,723,076

Sample size (firm years)	594	345	424
Earnings--continuing operations	(54,071)	35,436	2,309,621
Cash--operating activities	561,374	606,051	4,840,106
Cash ratio	3.05	2.58	0.70
Standard Deviations:			
Total assets	61,334,084	77,901,539	334,327,117
Net revenue	12,801,844	15,668,214	253,215,029
Earnings--continuing operations	3,305,204	2,864,448	18,266,374
Cash--operating activities	4,768,924	4,030,709	35,808,600
Cash ratio	43.17	26.58	15.98

Amounts in thousands of dollars, except cash ratios

The data used for the third statistical test, the comparison of means of the cash ratios for the fraud group sample firms before and after the restatement of their financial statements, was modified for subsequent use in the matched pairs repetition of that test. The means for total assets, net revenues, income from continuing operations, cash flows from operating activities, cash ratios, and the standard deviations for each of these means are presented in Table 3.

Table 3

Descriptive Statistics, Matched Pairs Samples

	Matched pairs	
	Before group	After group
Means		

Total assets	14,398,927	13,893,934
Net revenue	5,565,556	5,129,826
Sample size (firm years)	179	179
Earnings--continuing operations	873	(69,775)
Cash--operating activities	920,339	723,363
Cash ratio	0.66	4.23
Standard deviations		
Total assets	72,085,807	74,026,959
Net revenue	16,526,275	15,414,474
Earnings--continuing operations	3,477,906	2,100,641
Cash--operating activities	6,470,336	4,160,422
Cash ratio	6.62	36.49

Amounts in thousands of dollars, except cash ratios

The data and information presented were organized in the order of the research questions, intended to explain the results of the statistical tests within the scope limitations of the methodology.

Research Question 1. In the literature of fraud examination, auditing, and accounting, it is widely assumed that there is a strong cause and effect relationship between reported earnings and the cash flows ultimately derived

from those earnings (Albrecht et al., 2006; Dechow et al., 1998; Financial Accounting Standards Board, 1987; Nikolai et al., 2010).

Q1. To what extent, if any, is there a correlation between (a) cash flows from operating activities and (b) earnings from continuing operations?

This question allowed testing of the intuitional predicate of the study, confirmed by Dechow et al., that there is a close positive relationship between (a) cash flow from operating activities and (b) earnings from continuing operations (the cash flow ratio). This correlational relationship created the predicate for study of changes in the cash ratio as a predictor of fraudulent financial reporting. The components of the cash flow ratio are causally related, based on intuition drawn from knowledge of accounting; the test for the first research question simply allows that intuition to be demonstrated statistically.

The test for the first research question was the calculation of Pearson's *r* for the components of the cash flow ratios in the various data samples, where the numerator of the cash flow ratio was cash flow from operating activities and the denominator was earnings from continuing operations. Table 4 shows the results of these calculations for the various samples.

Table 4

Pearson's r for Components of the Cash Ratios

	Correlation Coefficients	Coefficients of Determination	*N*
Control group	0.970	0.94	424
Fraud group before restatement	0.444	0.20	594
Fraud group after restatement	0.645	0.42	345

All samples combined	0.947	0.90	1,363

Research Question 2. To what extent, if any, is the cash flow ratio (the ratio between (a) cash flows from operating activities and (b) earnings from continuing operations) different for firms with detected financial reporting fraud compared to firms without detected financial reporting fraud? For this question, the mean of the cash ratios for the fraud group before restatement firms was compared to the mean of the cash ratios for a sample of firms drawn as a control group, without identified fraud. The comparison statistic was the *t* statistic, calculated assuming that the population variances were not equal. The fraud group sample size was 594 firm years. The control group sample size was 424 firm years. The *t*-tests (two-tailed, unequal variances) at the .05 level of significance showed the means of the cash ratios were not significantly different: $t(801) = 1.21$, $p = .220$. The means, standard deviations, sample sizes and *t*-test results are shown in Table 5.

Table 5

Sample Descriptions, & t-tests, Research Question 2

	Fraud (before) group	Control Group	Test results
Sample Size	594	424	
Sample Mean	3.0537	0.7088	
Sample Standard Deviation	43.1708	15.9851	

t-value	1.21
Degrees of freedom	801
p-value	.220

Research Question 3. To what extent, if any, is there a change in the cash flow ratio (the ratio from (a) cash flow from operating activities to (b) earnings from continuing operations), for fraud firms before and after the identification of fraudulent financial reporting? As for research question 2, *t*-tests were employed, using the fraud group before restatement for the first sample and the fraud group after restatement for the second. The *t*-tests for this research question were conducted twice. The before and after restatement samples used in the first iteration did not include a requirement for matched pairs; thus, the samples were assumed to be independent. That is, although the before restatement group contained fraud firms before the identification of the fraud and resulting restatement (n = 594), and the after restatement group contained firms after the identification of fraud and resulting restatement (n = 345), the two samples did not necessarily contain matched pairs; a given firm could be in one sample and not in the other. Accordingly, although the test was with before and after type data, the samples were independent and it was not a repeated measures/matched pairs type test. To improve the blocking power of the before and after test, however, the samples were culled of non-matched firms and the

resulting before and after fraud identification and resulting restatement sample (*N* = 179) was tested as a repeated measures/matched pairs test.

For iteration A, the comparison was made using the *t* statistic, calculated assuming that the population variances were not equal. The fraud group before restatement sample size was 594 firm years. The after restatement group sample size was 345 firm years. The *t*-test (two-tailed, variances not equal) at the .05 level of significance showed the means of the cash ratios were not significantly different: $t(933) = .208$, $p = .836$. The means, standard deviations, samples sizes and *t*-test results are shown in Table 6.

Table 6

Sample Descriptions, & t-tests, Research Question 3, Iteration A

	Fraud (before) group	Fraud (after) group	Test results
Sample Size	594	345	
Sample Mean	3.054	2.581	
Sample Standard Deviation	43.2	26.6	
t-value			.208
Degrees of freedom			933
p-value			.836

As planned, in an attempt to eliminate noise from uncontrolled factors, a repetition of the *t*-test for research question 3 was conducted using matched

pairs samples. By definition, the matched pairs samples were of equal size. The two samples from the first iteration of the test for research question 3 were reduced in size by the process of limiting them to matched pairs immediately before and immediately after the fraud, culling firms that did not have a match for the last year before restatement and the first year after restatement, and by culling all other firm years. The result of these modifications was two equal samples of 179 fraud/restatement firms, with sample 1 containing data for one year before restatement and sample 2 containing data for one year after restatement. The result of this modified repetition of the third statistical test was $t(178) = 1.43$, $p = .153$. The null hypothesis of no difference in the means of the two samples could not be rejected at the .05 level of significance. See Table 7.

Table 7

Sample Descriptions, & t-tests, Research Question 3, Iteration B

	Fraud (before) group	Fraud (after) group	Test results
Sample Size	179	179	
Sample Mean	.666	4.233	
Sample Standard Deviation	43.2	26.6	
t-value			1.43
Degrees of freedom			178
p-value			.153

Evaluation of Findings

The results of the study indicated that the two components of the cash ratio, (a) cash from operating activities for the numerator and (b) earnings from continuing operations for the denominator, were correlated. For firms in the fraud group the correlation was not as strong. This was as expected: fraud, especially in forms affecting sales and accounts receivable, such as the reporting of fictitious sales, upsets the relationship of operating related cash flows to operating related earnings. This research adds to the field of study, and offers an additional method for detecting fraud, in that the particular gap in the literature of fraud detection research dealing with the ratio of cash flows from operating activities to earnings from continuing operations as an indicator of financial reporting fraud has now been addressed.

The hypothesis test for research question 2, comparing the means of the cash ratios for the before restatement fraud group and the control group did not show the means were significantly different. This indicates that the observation of change in a firms' cash ratio does not present significant evidence of fraudulent financial reporting.

The hypothesis test for research question 3, comparing the means of the cash ratios for the before restatement fraud group and the after restatement fraud group also did not show the means were significantly different, either with the full unequal samples for the two groups or with the equal matched pairs samples. This means that the observation of changes in the means of the cash

ratios for firms before and after restatement of their financial reports does not provide a clear indication of fraudulent financial reporting.

Summary

To what extent was there a correlation between the components of the cash ratio? To what extent, if any, was the cash ratio for firms in a fraud group different from the cash ratios of firms in a control group without fraud? To what extent, if any, was the cash ratio for firms with fraud before and after the fraud? These three research questions were examined in the research presented in this paper.

As predicted, the intuitional inference drawn from knowledge of accounting that there was a directly proportional relationship between earnings from continuing operations and cash flow from operating activities (the components of the cash ratio) was confirmed by the correlation analysis. Although correlation is directional in the sense of measuring whether a relationship between an independent variable and a dependent variable is directly or inversely proportional, measures of correlation are non-directional in the sense that they provide no information about which variable acts on the other, and do not show cause and effect. Without evidence of the correlation, however, there would be little point in studying changes in the cash ratio in the subsequent research questions.

The results of the tests for the second and third research question hypotheses did not show statistically significant differences in the means of the cash ratios between fraud and non-fraud firms, and statistically significant

differences in the means of the cash ratios of firms before and after fraud were not demonstrated, as well.

CHAPTER 5: IMPLICATIONS, RECOMMENDATIONS, AND CONCLUSIONS

Fraudulent financial reporting in the United States is a problem for auditors, regulators, investors, and other users of financial statements (Sessions, 1990; Wells, 1997). With losses from fraudulent financial reporting more than $100 billion a year (Association of Certified Fraud Examiners, 2008) the problem faced by investors, auditors, regulators and other users of financial statements is identifying fraudulent financial reporting. A gap in the literature of the detection of fraudulent financial reporting existed, specifically in the use of the cash ratio as a potential technique to help in the identification of fraudulent financial reporting involving revenue, receivable and operating cash misstatement.

The purposes of the quantitative study were as follows: (a) to determine the extent, if any, of correlation between the components of the cash ratio, (b) to determine if there was a difference in the cash ratio for firms with detected financial reporting fraud compared to firms without detected financial reporting fraud, and (c) to determine if there was a change in the cash ratio for fraud firms before and after the identification of fraudulent financial reporting. The predicate for the study was the demonstrated need of investors, auditors, regulators, and others for a tool or technique that would reliably indicate the presence of undetected fraudulent financial reporting. The study was focused on fraudulent reporting that involved fictitious or otherwise fraudulent entries to the records that affected the sales accounts or the accounts receivable balances.

The study was designed to include three data analyses. First, a simple correlation analysis—calculating Pearson's *r*— was employed to calculate the strength of the correlation between the components of the cash ratio across the fraud group firms' data before and after restatement of their financials, and for the control group firms' data. Correlation does not indicate the direction (or existence) of a cause and effect relationship, but without evidence of the correlation, there would be little point in studying changes in the cash ratio in the subsequent research questions. Second, the plan called for using *t*-tests comparing means, in a quasi-experimental static design, with pre- and post-treatment analysis and randomized blocked data, to test if the cash flow ratio was different for firms with identified financial statement reporting fraud versus a control group without identified financial statement reporting fraud. Third, a design without a control group was used to determine if the means of the cash flow ratios were different for firms with identified financial statement reporting fraud before and after the identification of the fraud. This calculation also utilized a *t*-test comparing means.

Significant limitations on the expected outcomes occurred because of inherent flaws in the data. As pointed out by Magrath and Weld (2002), there can be difficulty in detecting fraudulent earnings management because the intent of those who commit fraud is to hide their activities. The data were drawn from financial statements that inherently were not as precise as they may have appeared because of estimates, summarization, rounding, individual judgment in the application of generally accepted accounting principles, and individual

professional judgment in the determination of the meaning of materiality, as well as because of the nature of internal accounting control systems (American Institute of Certified Public Accountants, 2006; Arens et al., 2005; Committee of Sponsoring Organizations, 1985; Financial Accounting Standards Board, 1978; Kanodia et al., 2005; Nikolai et al., 2010). This imprecision created a significant limitation on the expected results of the research. Another significant potential source of error in the study was the difficulty of assigning the end date to detected fraud based on restatement of the financial reports. To the extent the before restatement and after restatement financial data were not selected properly, or to the extent that the restatement data did not reflect the end of the fraudulent reporting, the before and after tests would be flawed.

No human or animal subjects were used in the study. All data for this research came from publicly available databases of secondary data. The Northcentral University Institutional Review Board ruled the research was exempt from their review.

The balance of this chapter summarizes the study by discussion of the individual research questions, with conclusions drawn as supported by the results of the statistical tests. This is followed by an analysis of the results and the limitations of the research, and a section to discuss the implications of the research. The chapter ends with a section devoted to recommendations for further research and brief conclusions.

Summary of the Study. The study was conducted (a) by calculating Pearson's *r* for the components of the cash ratio for several samples of fraud

firms, both before and after they restated their financial statements, and for a control group sample for which no fraud had been detected, (b) by calculating the *t*-statistic for the difference in the means of the cash ratios of the fraud group sample before the restatement of the financial reports compared to the control group, and (c) by calculating the *t*-statistic for the difference in the means of the cash ratios of the fraud group before and after the restatement of the financial reports.

The purpose of the correlation statistic calculation was to confirm or deny the intuitively known directly proportional association between earnings from continuing operations and cash flows from operating activities. The purpose of the *t*-tests of the null hypotheses of no difference in the means of the samples was to ascertain, ceteris paribus, if a change in a firm's cash ratio might be a signal of fraudulent reporting of the kind investigated that was sufficient to be useful to the investors, auditors, regulators, and others in need of such a signal.

Although the independent variable in the study was fraudulent financial reporting, the main dependent variable, and the subject of the research, was the cash ratio. The cash ratio was defined as current period cash flows from operating activities divided by current period earnings from continuing operations.

The data indicated, as predicted, there was a correlation between the two components of the cash ratio, and that for the fraud samples and the control group the correlations could be characterized, according to Hopkins (2008) as very high or nearly perfect, and are characterized as high in more traditional interpretations, such as Zikmund (2003). The correlation coefficient between the

two components of the cash ratio for the fraud sample before restatement only could be characterized only as a low correlation. The characterization of the correlation between the two components of the cash ratio for the fraud group after restatement was moderate correlation. These differences were not significant but showed the tendency for the introduction of fraud to disrupt the predicted relationship between earnings from continuing operations and cash from operating activities, where the fraud involved sales, receivables, or cash from operating activities.

A *t*-test of the means of the cash flow ratios for test groups in a quasi-experimental static design, with pre and post treatment analysis, and randomized data, was used to test if the cash flow ratio was different for a treatment group of firms with identified financial statement reporting fraud versus a control group without identified financial statement reporting fraud. This test did not show the means of the treatment and control groups to be significantly different. This means that differences in a firm's cash ratios compared to the cash ratios of other firms may not be useful as an indicator of financial reporting fraud.

Another *t*-test was used to compare means in a design without a control group, to determine if the means of the cash flow ratios were different for firms with identified financial statement reporting fraud before and after the identification of the fraudulent reporting. The population of fraud firms was drawn from a database prepared as part of a report to Congress mandated by the Sarbanes-Oxley Act of 2002 (United States Government Accountability Office, 2007). This test, and a subsequent reiteration with matched pairs, did not show

the means of the cash ratios before and after fraudulent financial reporting to be significantly different.

Analysis of the Results. Given the correlation statistics and the intuitive understanding of the relationship between cash from operating activities and earnings from continuing operations, the prediction of statistically significant differences in the means of the fraud group compared to the control group was a logical expectation. The discussion is now turned to some reasons why the tests of the changes in the cash ratios did not show significant differences, although the correlation between the components of the cash ratio was shown.

1. The control group may have contained fraudulent data. One explanation of the lack of statistical significance in the tests is that both the fraud group data and control group data were flawed. The control group was a random selection of firms for which fraud was not identified by the definition of having restated their financial statements and appearing in the Government Accountability Office database of restaters. This did not mean there was no fraud present in the firms represented in the control group sample; it meant any fraud present was not identified by that particular definition. Any fraud that was present in the non-fraud control group sample was undetected fraud, so those firms could not be identified and culled from the control group sample. This flaw in the data set tended to attenuate the difference in the means of the cash ratios between the treatment group and the control group, and lowered the chance of statistical difference between the two means.

2. The fraud group may have contained non-fraud data. In the fraud group, there was little direct evidence that fraudulent financial reporting had been committed. The data were selected from a database of firms that restated their financial reports, and to the extent possible, the sample was composed of restatement firms whose restatements involved revenues or receivables. Nonetheless, only a handful of such firms were directly and specifically identified in the database as having engaged in fraudulent financial reporting. The firms in the sample were vetted for fraud by checking the Internet for press items and filings with the Securities and Exchange Commission that indicated fraud. When companies restated their financials, even to correct fraud, it appeared that they rarely made direct statements admitting to fraud. More often for instance, they might have reported the restatements were to correct accounting irregularities. Some firms from the restatement database were included in the sample because they were in the Government Accountability Office restatement database and were accused of fraud in class action lawsuits, where the frauds alleged in the pleadings included fictitious revenue or receivables allegations. Nonetheless, the accusation of fraud is not necessarily conclusive, and no doubt, the companies filed denials for their answers. It is possible that some firms were included in the fraud group that should not have been included. This tended to attenuate the difference between the cash ratios of the fraud group and the control group.

3. The fraud group contained fraudulent data. An unmeasured factor in the fraud group is that by definition, it contained fraudulent data. The extent to which this condition, which not only was unmeasured but also may have been un-

measureable, may have affected the outcomes of the correlation and *t*-test calculations is unknown. It was reasonable to assume that unexpected outcomes might result from the use of this type of data (Magrath & Weld, 2002). The intention of those who commit such frauds is to hide their activities. According to Magrath and Weld, the important warnings signs of abusive earnings management are (a) cash flows not correlated with earnings, and (b) receivables not correlated with revenues and other items. These researchers pointed out that when revenue was appropriately recognized cash flows followed in a close and orderly fashion, but when cash flows lagged significantly behind revenue it could be indicative of inflated revenues recognized in incorrect periods, making sales to inappropriate customers, or recording fictitious sales.

4. Masking activity. The Securities and Exchange Commission has asserted (2003a) that firms engaging in fraudulent financial reporting through the recordation of fictitious revenues may engage in activities to mask the unfavorable financial statement effects of the fraud. An extreme example of this can be found in the activities of Enron (McLean & Elkind, 2003) but a clearer example of comes from Crazy Eddie (Association of Certified Fraud Examiners, 1999; Knapp, 2006). Eddie Antar and his family owned and operated a string of retail electronics stores in the New York, New Jersey, and Connecticut area in the 1970s and 1980s. When the firm was privately held millions of dollars of cash receipts were skimmed, and revenue reported in the financial statements was underreported to reduce tax liability. After their public offering, the tables were turned and they needed more revenue growth to increase earnings and keep the

stock price rising. To accomplish this, besides engaging in sophisticated inventory fraud, they recorded fictitious sales. Because the receivables from fictitious sales never get collected, company receivable balances rose disproportionately to sales, and the apparent age of the receivables increased as the receivable turnover ratio decreased. To mask these effects of the revenue fraud, the Antars repatriated millions of dollars of skimmed cash from its hiding places in foreign bank accounts, and recorded the cash receipts as reductions in accounts receivable. This meant the relationship of earnings from continuing operations, fraudulently increased with fictitious revenue, to the cash flow from operating activity was again changed, but the effects of the original fictitious sales were masked to an extent by the introduction of fictitious receivable collections.

5. Expectations of precision may not be justified. Financial statements may imply more precision than exists (Kanodia et al., 2005). The financial statements of large companies are often expressed in numbers rounded to the nearest thousand, if not the nearest million. The income statements, balance sheets, and statements of cash flows report numbers that are the result of the accounting process, which includes significant summarization and rounding, and many of the numbers reported contain management's estimates and assumptions (Financial Accounting Standards Board, 1978; Nikolai et al., 2010). Internal accounting control systems are designed to provide reasonable assurance, meaning cost-effective assurance, rather than absolute assurance, that the financial statements are presented fairly in all material respects (Arens et

al., 2005; Committee of Sponsoring Organizations, 1985). The results of the application of such systems and processes to financial reporting, and the imprecision inherent in financial statements, may require effect sizes to produce measurable differences in the means of the cash ratios at statistically significant results that do not exist in the data, or that exist only for the largest financial reporting frauds. In other words, the imprecision of the financial statements may render the precision required for statistical significance unlikely if not impossible to detect.

To counter the difficulties of inherent measurement imprecision, minimum sample sizes were calculated by measurements using Cohen's *d* to set effect sizes, and levels of significance were set at 5%. Nonetheless, the effectiveness of these procedures to counter the effects of measurement imprecision inherent in the financial data is not known (Gomez-Bezares & Gomez-Bezares, 2006).

6. Timing of before and after may have been incorrect. The identification of the beginning date of financial reporting fraud can present practical difficulties (Golden, Skalak, & Clayton, 2006; Lee et al., 1999). The fact of restatement of financials for any given accounting period is not conclusive evidence that fraudulent reporting (a) has stopped, or (b) been corrected. In the studies the restatement year indicated in the Government Accountability Office database was taken as the last year of fraudulent reporting, and subsequent after restatement years were assumed to be free of misstatement caused by fraudulent reporting. There can be no assurance that these assumptions were correct for all firms in the samples, and any amelioration or biasing of the effects

of fraudulent reporting because of such errors in identifying the ending dates for the fraudulent reporting was not measured.

Implications

This study was designed to expand on and improve the work of Beneish (Beneish, 1997, 1999), Lee et al. (1999), Dechow et al. (1995) and others. It has produced a tool or technique that should provide auditors and other interested users of financial statements a useful technique to add to the repertoire for detection of fraudulent financial reporting. A gap existed in the literature of the detection of fraudulent financial reporting about the ratios of cash flows from operating activities to earnings from continuing operations before and after, and with and without, fraudulent financial reporting.

The contribution to the literature from this study is potentially significant given that fraudulent financial reporting is a serious problem involving significant losses to the investing public, regulators, creditors, financial analysts, auditors, and others. Like other methods in the literature, the technique of looking for change in firm's cash ratio offers only a signal that financial reporting fraud may have taken place. Investors, regulators, auditors, and others interested in financial statement reporting fraud for a specific firm should consider that signal in the context of the activities of management of the firm and in conjunction with a thorough risk assessment based on an understanding of the company's internal accounting control structure and company practices, and in concert with other analytical techniques available in academic and practitioner literature in the anti-fraud, audit, and investing arenas.

The recent major financial statement frauds, such as HealthSouth, which reported more than $2.5 billion in fake earnings (Tonsick, 2004), WorldCom's total of $7.68 billion earnings from improper accounting (Beresford et al., 2003; Gibson, 2004), and the collapse of Enron (McLean & Elkind, 2003) have been spectacular. They have focused attention on accounting, auditing, fraud examination, and the detection and control of fraudulent financial reporting. The Securities and Exchange Commission was required by Section 704 of the Sarbanes-Oxley Act of 2002 to report to Congress on enforcement actions for the 5 years prior to enactment (Securities and Exchange Commission, 2003c). The content of the report was to include a study of enforcement actions to identify financial reporting areas susceptible to fraud, manipulation, and improper earnings management. The Securities and Exchange Commission study covered 515 enforcement actions filed between July 31, 1997 and July 30, 2002, based on 227 investigations, and reported that 126 of the 227 enforcement actions involved financial reporting fraud in which fictitious sales reporting, improper timing of recognition of revenue, and revenue valued improperly. Of the investigations reported, 80 involved fictitious revenue. Senior management was involved in at least 104 of these 126 cases.

According to the *Report to the Nation on Occupational Fraud & Abuse* (Association of Certified Fraud Examiners, 2008) from 43 to 45% of financial statement fraud schemes involve unreported liabilities or fictitious revenues. Others report core issues of income statement items dealing with continuing operations are involved in 63% of restatements (Palmrose & Scholz, 2004). The

Federal Bureau of Investigation reported more than 400 corporate fraud cases in 2006 alone, with 19 that resulted in losses to the public in excess of $1.0 billion each (2007). The cost of occupational fraud may have been has high as $994 billion in 2007, up from $650 billion for 2005 (Association of Certified Fraud Examiners, 2006, 2008). Fraud losses from financial reporting fraud may have been as much as $102 billion for 2008.

The relationship between financial reporting fraud and the difference between cash flows and earnings exists but a simple model that reliably detects the presence of such fraud does not. Beneish (1997, 1999, 2001) developed a multi-variant model to identify possible financial statement frauds, based in part on changes in working capital assets and liabilities over time, that were tantamount to cash flow to earnings comparisons. The Beneish model correctly identified financial statement fraud about 50% of the time. Lee et al. (1999) established that there is a statistically significant relationship between the incidence of fraud and the difference between earnings and cash flows, with a model that correctly identified fraud firms 73% of the time. Given the correlation and known relationship between cash from operating activities and earnings from continuing operations, the signal provided by an unexplained large change in the cash ratio for a firm, as with the signals from the Beneish and Lee et al. models, was sufficiently strong for auditors and others at least to warrant heightened awareness of the possibility of fraudulent financial reporting and concomitant auditor scrutiny.

Recommendations

The three-fold purpose of this quantitative study was to determine the extent, if any, that the two components of the cash ratio are correlated, to determine if the cash ratio was different for firms with detected financial reporting fraud compared to firms without detected financial reporting fraud, and to determine if there was a change in the cash flow ratio for fraud firms before and after the identification of fraudulent financial reporting.

Effect size. Among the difficulties with the development of a tool or technique to use in an analysis leading to the detection of fraudulent reporting was the lack of a clinically significant effect size, as opposed to a statistically significant effect (Hopkins, 2008; Riopelle, 2000). Given the observations of Gomez-Bezares (2006), Nilolai (2010), Arens (2005) and others about the inherent lack of precision in financial reports, the ubiquity of management estimates in the reports, and the application of auditors' professional judgment in the determination of the meaning of materiality, Hopkins' observations about the use of Cohen's *d* to set minimum sizes for Type II errors and need for a clinically useful result from research are critical. Lee et al.'s (1999) work dealt with the difference in cash flow and earnings as an indicator of fraud, but it was not focused on defining a useful or meaningful effect size. Controlling the effect size with Cohen's *d* also can be useful in limiting sample sizes without reducing the power of the tests (Faul et al., 2007).

Observations of the descriptive statistics. Observation of the descriptive statistics about the samples used in this research may lead to further

investigation. The range of the data in terms of total assets and net revenue across the fraud before restatement, fraud after restatement and control group samples varied widely, in that for the two fraud samples the standard deviations of the mean assets were more than five times as large as the means, and the standard deviation of the mean assets for the control group was 3.8 times the mean. The apparent size of the average firm in the random control sample was much greater than the average size of the firms in the fraud samples. The average total assets for control group firms were $86.8 billion; for the fraud groups before and after restatement, average assets were $11.8 billion and $13.8 billion respectively. For mean net revenue in the control group, the figure was $28.7 billion; for the fraud samples before and after restatement, the mean net revenue was $4.2 billion and $5.1 billion, respectively. In rough figures, then, the control group sample average firm was about six to seven times larger than the average firms from the fraud samples. This could mean any number of ideas that would be interesting to pursue.

Bias inherent in the selection of firms listed by the Government Accountability Office in their report of firms that restated their financials could be examined. These differences could reflect the relative resource-based sophistication and effectiveness of internal accounting control systems for larger firms versus smaller firms. Data about the size and frequency of white-collar fraud, including financial reporting fraud, indicated smaller firms had both a greater frequency of fraud incidents, and larger average fraud losses (Association of Certified Fraud Examiners, 2008). Analysis indicated that the

effectiveness of the internal accounting control systems in small firms with limited resources was lower than the more sophisticated and effective control systems of larger firms. Anomalies based on the relative sizes of the firms across the samples may present an area for further research.

Correlation. The calculations of Pearson's *r* were conducted in this research only to present a statistical confirmation of intuitional relationship between the components of the cash ratio, to predicate the *t*-tests of the null hypotheses of equality of means for the various samples. However, the coefficients of correlation for the two components of the cash ratios for the control group, the before restatement fraud group, and the after restatement fraud group showed interesting differences. In further research, it might be useful to determine if the coefficients of correlation for these sample groups are statistically different at normal levels of significance. If the differences are statistically significant, further research could be designed to investigate why the correlations for the samples were statistically different but the differences in the means of the ratios composed of those components were not statistically different.

Conclusions

In the context of the purpose of the research articulated in the research questions and purpose statement for the dissertation, this research has been successful. The need for the study was carefully documented in the review of the literature, and a gap in the literature that was filled by this research was found. The plan for the research was carefully designed and constructed to accomplish

the objectives of the research, and was executed as intended. The predicted outcomes of demonstrating correlation between the components of the cash ratio were highly correlated for the control group and for all samples taken as a single group, but showed only a low positive correlation for the fraud group before restatement, and were moderately correlated for the fraud group after restatement of the financial reports. The means of the cash ratios of the fraud group before and after restatement were shown to be different, and the means of the cash ratios of the fraud group before restatement were shown to be different from the same statistic for the control group, but neither was different at traditional levels of statistical significance.

In the context of the fit of the research to the gap in the literature, this research was both appropriate to the problem and similar to the extant literature from Lee et al. (1999), and Beneish (1999). Lee et al. and Beneish produced multi-variant models designed to detect financial reporting fraud. Both obtained mixed results for the same reasons that the single variable model developed for this research produced mixed results, and because of the complications introduced into their research by the nature of multi-variant models (Hribar & Collins, 2002; McNichols, 2000). These and other multi-variant models, for the disaggregation of earnings into its cash and accrual components and for direct detection of fraudulent financial reporting, returned only low levels of confidence for rejection of the null hypotheses denying earnings management at magnitudes of manipulation judged plausible, 5% of total assets (Dechow et al., 1995).

In the context of the procedures used to address the research questions, results were satisfactory. The correlation analysis used for research question 1 (what is the extent, if any, of correlation between the two components of the cash ratio?) was useful because it established a predicate necessary to the subsequent research questions. The use of *t*-tests instead of other methods, such as ANOVA, to analyze the data for the second and third research questions (concerning the differences in means of treatment and control group data), was appropriate because (a) the model specified invoked only fraud as the singular independent variable, (b) the samples were very large and could be considered normally distributed, (c) and for a single variable model, *t*-tests produce the same results as ANOVA, but are simpler. Thus, invoking Occam 's razor, *t*-tests were appropriate.

The results of the research were that there was a predicted statistical correlation between the cash from operating activity and earnings from continuing operations components of the cash ratio. The cash ratios for fraud firms appeared to be different from the cash ratios of non-fraud firms, but the differences did not rise to the level of statistical significance. Accordingly, investors, auditors, regulators, and others interested in the detection of fraudulent financial reporting involving fictitious sales or manipulations of the receivable accounts, only have an additional tool or technique available in the observation of the unexplained substantive change, from one accounting period to another, in the cash ratio to use in conjunction with other traditional analytical techniques

from the auditor's or securities analysts' tool kits, that can alert them to the possibility of financial statement reporting fraud.

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