

The Effects of the Sarbanes-Oxley Act of 2002 on Earnings Quality

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Abstract:

The Sarbanes-Oxley Act of 2002 (SOX) was enacted into law on July 30, 2002 after the collapse of WorldCom and Enron. SOX is designed to enhance the reliability and accuracy of the financial statements by placing more responsibility on the management of publicly traded companies. It is believed that under SOX public companies will have less opportunity to manage their earnings and commit fraud. In addition, SOX places further responsibilities on audit firms while strengthening their independence. The purpose of this study is to empirically examine within the S&P 500 (1) whether SOX has improved the quality of the earnings reported in the financial statements and (2) investigate associations of firm specific characteristics with earnings quality changes surrounding SOX. The results indicate that management reports higher quality earnings after SOX, and the change is negatively associated with cumulative abnormal stock returns during the SOX legislative period and size.

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I. INTRODUCTION

In the early 2000's, a crisis arose in the accounting profession as large accounting firms provided both assurance and consulting services to clients. Pressure to provide more lucrative consulting services at the expense of assurance lead to conflicts of interest. Subsequently, numerous well-known companies were found to have been misstating earnings. As a result, companies audited by Arthur Andersen, such as Sunbeam and Waste Management, were forced to restate their earnings, exposing enormous losses and ultimately leading to bankruptcy for many of these companies. Accounting firms, especially Arthur Andersen, lost credibility. The FBI began an investigation of Arthur Andersen, eventually leading to criminal charges against the firm for obstruction of justice by shredding crucial documents related to Enron. (Ferrell, Fraedrich and Ferrell 2008).

In response to the collapse of WorldCom in 2002 and Enron in 2001 and the crisis in the accounting profession, the Sarbanes-Oxley Act of 2002, or SOX, was enacted into law on July 30, 2002.¹ SOX contains a number of regulations to enhance corporate responsibility and financial disclosures in order to generate higher quality earnings in financial statements. Through the creation of the Public Companies Accounting Oversight Board (PCAOB) under Section 101, SOX provides guidance and oversight for auditors. SOX places limitations on the types of non-audit services that can be provided by accounting firms under Section 202. Furthermore, Section 302 of SOX requires management to take full responsibility for the financial statements by requiring the CEO

¹ For an overview of SOX, see Arens, Elder and Beaseley (2004) and for the full text of the Act, visit <http://www.sec.gov/about/laws/soa2002.pdf>.

and CFO of each public company to sign off on their reliability. The last aspect of SOX to be implemented is the internal control requirements under Section 404. Section 404 requires public companies to disclose any changes to internal controls throughout the year, perform an assessment of internal controls and include an auditor opinion of internal controls (Arens, Elder and Beasley 2004).

According to Jain and Rezaee (2004), the act has many positive outcomes associated with it, such as preventing auditor's conflicts of interest, minimizing management's opportunities and temptations to mislead investors and establishing penalties that encourage management to fulfill their responsibilities. SOX's requirement for an annual audit of internal controls may lead to improvements in internal control systems which should reduce costs, loss and theft. Bedard (2006) finds that the costs associated with SOX are centered on the internal control requirements, under Section 404, and include audit fees as well as costs of improvements to internal control systems. In addition, firms also incur costs associated with changing the composition of their audit committees and boards of directors to be in compliance with SOX. The billions of dollars of costs imposed on companies as a result of SOX raise the question of whether the improvements to the reliability of the financial statements are worth the costs (Securities and Exchange Commission 2003)².

² In response to these soaring costs, the PCAOB adopted Auditing Standard No. 5 on July 25, 2007, which replaces Auditing Standard No. 2, to increase the reliability and accuracy of the financial statements while reducing unnecessary costs. Scalable to company size and complexity, the new standard, unanimously approved by the commission, helps alleviate costs of internal control audits for smaller and less complex firms. Less than half the length of Auditing Standard No. 2, Auditing Standard No. 5 allows auditors to use their judgment and focus on areas of materiality and risk rather than following a lengthy list of rules. For more information about Auditing Standard No. 5, visit www.pcaob.com or <http://sec.gov/news/press/2007/2007-144.htm>.

The purpose of this study is to investigate whether the implementation of SOX has resulted in management generating financial statements with higher quality earnings, one of the outcomes of enhanced corporate responsibility and financial disclosures. Utilizing accounting accruals as the measure of the quality of reported earnings, this study compares the pre- and post-SOX periods using the residuals from firm-specific regressions of changes in working capital on cash flows from operations and finds that the quality of earnings has increased. In additional tests, this paper investigates the association of changes in earnings quality with firm specific characteristics, such as cumulative abnormal stock returns during the SOX legislation period, a disclosed ethics program in the pre-SOX period, firm size, and auditor in the pre-SOX period. This study finds a significant negative association between the changes in earnings quality and firm size and cumulative abnormal stock returns from the legislation period. The disclosure of a code of ethics in the pre-SOX period is marginally negatively associated with changes in earnings quality. There is no significant association between the changes in earnings quality and auditor in the pre-SOX period.

This study extends current research by using a more general model of earnings quality focusing on accruals and using a longer window in the post-SOX period to test for earnings quality changes. Furthermore, other studies assessing the impact of SOX investigate specific firms identified as having material weaknesses in internal controls, but this thesis encompasses all firms in the S&P 500 complying with SOX. The results, therefore, are more general when assessing the overall effects of SOX. Finally the study provides evidence indicating which firms may benefit the most from SOX.

The remainder of this thesis is organized as follows. In section II, the details of SOX are elaborated on including a table that summarizes the key sections of the act. Section III discusses earnings quality, earnings management and the use of accruals as a measure of earnings quality. Subsequently, section IV summarizes the current body of research investigating the effects of SOX. In section V, the research methods and hypotheses are presented. Section VI discusses the derivation of the sample data used in this study and includes descriptive statistics and correlations between variables. The results are presented in section VII, which also includes a brief sensitivity analysis. Finally, a synopsis of the study is included in section VIII.

II. THE SARBANES-OXLEY ACT OF 2002

The overall purpose of SOX is to increase the accuracy and reliability of the financial statements of public companies by tightening reporting standards. Table 1 summarizes the sections of SOX. The first action taken under SOX was the creation of the Public Company Accounting Oversight Board (PCAOB) under Section 101 to monitor accounting firms. The PCAOB is an independent national committee consisting of five members, two of which must be Certified Public Accounts (CPAs). The PCAOB oversees and investigates audits, reviews existing professional standards, considers audit standards and reviews auditor's testimony of internal controls. The purpose of this board is to provide guidance and oversight for the auditors of public companies by establishing quality control and ethical standards, performing inspections and monitoring internal controls. In addition, the PCAOB proposes auditing rules that must be approved by the SEC before enactment (Arens, Elder and Beasley 2004).

TABLE 1
Summary of the Sarbanes-Oxley Act of 2002

Section	Title	Description
Section 101	Establishment & Administrative Provisions	Establishes PCAOB to oversee audits, create standards, review auditor's testimony of internal controls
Section 102	Registration with the Board	Requires audit firms involved with public companies to register with the Board
Section 104	Inspection of Registered Public Accounting Firms	Verifies the accuracy of the financial statements
Section 201	Services Outside the Scope of Practice of Auditors	Restricts auditors to attest activities only to help ensure independence
Section 203	Audit Partner Rotation	Rotates partners to different clients for alternative perspectives
Section 204	Auditor Reports to Audit Committees	Auditors must report to audit committee which is independent of the company
Section 301	Public Company Audit Committees	Requires each public company have an independent audit committee
Section 302	Corporate Responsibility for Financial Reports	Makes CEOs and CFOs personally liable and responsible for the accuracy of financial statements
Section 303	Improper Influence on Conduct of Audits	Removes power from company personnel to eliminate the withholding of information from auditors
Section 404	Management Assessment of Internal Controls	Allows auditors to express opinion on policies and procedures of the company

Section 201 enhances the independence of accounting firms by preventing auditors from taking on any management role, auditing his/her own work or serving as an advocate for the client. SOX makes it unlawful for accounting firms to provide non-audit services to a public company, such as bookkeeping, financial information system design

or implementation, appraisals, actuarial services, internal audit services, human resources services or legal services. As a result of these restrictions, three of the large international accounting firms sold their highly profitable consulting practices.

Moreover, SOX has additional requirements related to the auditor that help ensure accuracy and reliability of reported earnings in the financial statements. For example, Section 102 of the act requires audit firms involved with public companies to register with the board, while Section 104 requires an inspection of these registered accounting firms to verify the quality of their audits. In addition, under Section 203 of SOX, audit partners must rotate to different clients to ensure alternative perspectives and to prevent continual dealings between audit partners and clients. Finally, Section 303 removes the power from company personnel to withhold information from the auditors.

In addition to regulating the auditors, SOX clearly defines the responsibilities of management. For example, Section 301 requires public companies to have an audit committee consisting of independent members of the board of directors and at least one financial expert. Under Section 204, auditors must report directly to these independent audit committees. In addition, Section 302 requires the CEOs and CFOs of publicly traded companies to take responsibility for their financial statements by certifying them. When the CEO and CFO sign the financial statements, they are stating that they have reviewed the report, properly disclosed information pertaining to audit committee independence and changes in internal controls, and verified that the report does not contain false statements or material errors (Arens, Elder and Beasley 2004).

Finally, SOX Section 404 requires management of public companies to assess and report on internal controls. The auditor must report on management's assertion about

internal controls and perform tests on all significant account balances rather than just account balances of the financial statements. Companies must disclose in their financial statements that management is responsible for establishing and maintaining internal controls. In addition, the financial statements must contain an assessment on the effectiveness of the internal controls (Arens, Elder and Beasley 2004).

III. EARNINGS QUALITY

Earnings Quality and Earnings Management

Signifying stability, diligence and predictability of reported earnings, earnings quality is an important tool for evaluating a company's permanence and predicting future earnings. Earnings quality refers to the relationship between reported earnings and the true earnings of a company. While high earnings quality represents a strong correspondence between reported earnings and true earnings, low earnings quality represents a weak correspondence between reported earnings and true earnings. (Bellovary, Giacomino and Akers 2005). Useful to investors, users of financial reports, and accounting standard setters, such as the SEC, earnings quality reveals the underlying economic condition of the company (Schipper and Vincent 2003). While it is impossible to measure true earnings, several models have been developed to assess the level of changes in earnings quality.

Earnings management occurs when managers of public companies alter true earnings through the exercise of judgment to either mislead users of the financial statements about the underlying economic performance of the company or influence business outcomes that rely on reported earnings. Manager's judgment is applied in many

different circumstances, such as estimating future economic events, choosing accounting methods, estimating working capital, making or deferring expenditures, and structuring corporate transactions (Healy and Wahlen 1999). Depending on alternative motives, pressures and target goals for the company, management decides the degree and direction in which earnings will be manipulated. By use of different means, management can either conceal poor performance or save current earnings for possible use in the future (Jones 1991).

Accruals as a Measure of Earnings Quality

There are many different methods to measure earnings quality which evaluate different aspects of a firm, including changes in accounting methods, accounting structure, and accruals (Jones 1991). This study uses the accruals model of earnings quality developed by Dechow and Dichev (2002). Machuga and Teitel (2007) and Naiker and Navissi (2004) have used this model to assess changes in earnings quality in different time periods. The model begins with the following representation of reported earnings, in which RE is reported earnings, CFO is cash flows from operations, A_t is the accruals and ε_t is the error term.

$$RE = CFO_t + A_t + \varepsilon_t \quad (1)$$

Accruals are accounts on the balance sheet where economic events for which cash flows have not yet been realized are recorded. Temporary adjustments that shift recognition of cash flows over time, accruals consist of two entries, an opening entry and a closing entry. The opening entry is recorded when either a revenue or expense is recognized before the cash has been received or paid, or when cash has been received or

paid before a revenue or expense has been recognized in earnings. The closing entry occurs when the alternative piece has occurred (Dechow and Dichev 2002).

As a result, management must estimate the amount of cash to be received or paid in the future when the revenue or expense has been recognized before the cash has been received or paid. Because the opening entry is an estimation, it contains errors that are corrected by the closing entry. These errors are both intentional and unintentional.

A measure of accrual and earnings quality, the error term captures the extent that cash flow realizations differ from their actual estimates. Dechow and Dichev (2002) map out the association between cash flows from operations and accruals and make several substitutions until reaching the final theoretical model of accruals. The theoretical model below illustrates that the accruals at any point in time can be explained by cash flows.

$$A_t = CF_{t-1}^t - (CF_t^{t+1} + CF_t^{t-1}) + CF_{t+1}^t + \varepsilon_{t+1}^t - \varepsilon_t^{t-1} \quad (2)$$

While the subscripts refer to the period in which the opening accrual entry is initiated, the superscripts refer to the period in which the closing accrual entry is completed. Cash flows from operations in time period t are cash flows from operations from the current time period. Cash flows that are accrued during the prior time period $t-1$ are the accruals recorded last time period that result in cash flows during the current time period. Finally, accruals deferred during the current time period $t+1$ are recorded during the current time period and will be collected in the next time period. Accruals in the current time period (A_t) should reflect cash flows from operations deferred from the prior time period (CF_{t-1}^t), cash flows from operations from this period both deferred from the prior time

period and collected this time period ($CF_t^{t+1} + CF_t^{t-1}$), cash flows collected next time period but recorded this time period (CF_{t+1}^t), and the error for this time period and next time period ($\varepsilon_{t+1}^t - \varepsilon_t^{t-1}$). See Dechow and Dichev (2002) for the full development. The model implies that given perfect knowledge of past, present and future cash flows, accruals in a specific year can be estimated. The difference between the cash flows and accruals are the errors in accrual estimation. The greater the errors, the lower the quality of accruals and earnings.

IV. LITERATURE REVIEW

The passage of SOX has generated significant academic interest. The types of research range from analyses of market reaction to the passage of SOX to investigations of firms with internal control weaknesses identified by Section 404 audits of internal controls. This section offers a review of the current research evaluating the effects of SOX.

Market Reaction

SOX had its first major impact on companies when the law was passed. This first section discusses two papers that investigate the stock market reaction to the passage of SOX. Jain and Rezaee (2006) finds a positive abnormal stock return associated with the passage of SOX. Overall, it finds that the market reacts more positively to firms with efficient corporate governance, consistent financial reporting, and trustworthy audit procedures in the pre-SOX period. Concluding that the benefits surrounding SOX far outweigh the imposed compliance costs of the act, Jain and Rezaee (2006) finds that the

market is reacting more positively to firms in compliance with SOX, revealing that the goals of SOX are in reach.

A second study by Chhaochharia and Grinstein (2007) investigates the announcement effect of the new SOX governance rules on firm value. Portfolios of firms are constructed based on the degree to which firms comply with the rules. The results indicate that portfolios of firms that are less compliant with the rules earn positive abnormal returns compared to portfolios of firms that are more compliant. Furthermore, this paper finds that firms that restated their financial statements, firms whose insiders are perceived as manipulating the market, firms that have related party transactions, and firms that did not comply with the board independence requirement outperform their peers during the announcement period. Finally, this study shows that large firms that are less compliant earn positive abnormal returns while smaller firms that are less compliant earn negative abnormal returns, indicating that some provisions are disadvantageous to small firms.

Audit Committee and Quality

Once SOX was passed, companies had to comply immediately with the audit committee composition rules and auditors could no longer perform non-audit services. Bryan, Liu and Tiras (2004) investigates audit committees and their relation to ethics programs. When comprised of ethical members that are independent, are financially literate, commit sufficient time to the committee and meet regularly, audit committees enhance the financial reporting process. After testing earnings usefulness via an earnings response coefficient and a transparency measure using the degree of mispricing found

with accruals, this paper finds that audit committees enhance the quality of reported earnings.

Fuerman (2003), in contrast, investigates audit quality. This study looks at the top six audit firms individually to determine if the quality of audits is consistent among the firms. The quality of audits and the quality of financial statements is based on the outcomes of class action lawsuits filed against audit firms. The results indicate that five of the top six accounting firms perform similarly high quality audits. However, Arthur Andersen does not fit in with the other five, delivering, on average, lower quality audits than the rest.

Earnings Quality and Earnings Management

After SOX was in effect for two years, the first earnings quality studies were published. In a pre- and post-SOX study, similar to this thesis, Lobo and Zhou (2006) examines conservatism in financial reporting in the two years before and the two years after the passage of SOX. Using a modified Jones model to compare discretionary accruals and the Basu (1997) approach to assess whether earnings reflect bad news more quickly than good news, Lobo and Zhou (2006) finds that firms report lower discretionary accruals after SOX than in the pre-SOX period and firms incorporate losses more quickly than gains when they report income in the post-SOX period than in the pre-SOX period, suggesting that firms are more conservative in the post-SOX period.

Depken and Ouyang (2006) study the firms in the three major U.S. stock exchanges to determine if earnings management has decreased. This study looks at quarterly data from the pre- and post-SOX periods to empirically analyze whether or not

SOX curtailed earnings management activities. Using a model of earnings management based on the ratio of firms announcing “small profits” versus “small losses,” this paper finds that earnings management declined by up to 12%.

Internal Control

The last major component of SOX, Section 404 Internal Control Audits, was required beginning in 2004. This section discusses the studies that investigate the impact of the internal control requirement on SOX. In a study of auditing intensity and internal control strength in response to SOX, Patterson and Smith (2007) consider how the new fraud prevention measures of SOX impact the audit environment for the auditor, who must detect and deter fraud, and the management, who must comply with new fraud prevention measures. This paper uses a strategic model of auditing in which the manager chooses internal control strength and the amount of fraud while the auditor chooses the amounts of internal control testing and substantive testing. Finding that strength in internal control increases and the amount of fraud decreases, Patterson and Smith (2007) conclude that SOX has achieved its goal, based on early evidence, of decreasing fraud in firms through the improvements in internal control structures.

Furthermore, Bedard (2006) investigates the association of the internal control requirements of SOX with earnings quality. Using unexpected accruals measured by the Jones (1991) model to assess earnings quality, this paper finds that SOX internal control requirements lead to improved earnings quality for firms that disclosed internal control weaknesses. The amount of unexpected accruals increases in the year the internal control

weakness is disclosed, suggesting that management reversed the prior year's accruals that were misstated.

Studying the disclosure of material weaknesses in the post-SOX period, Ge and McVay (2005) investigates 261 firms that disclosed at least one material weakness in internal control in their SEC filings. The results of this study indicate that disclosing a material weakness is positively associated with business complexity and negatively associated with firm size and firm profitability, which are consistent with prior research.

This thesis extends prior research in several ways. First, it empirically assesses the impact of SOX on earnings quality by using an alternative to the Jones (1991) model to assess accruals quality as a measure of earnings quality. Second, assuming SOX benefits all firms, this study investigates all firms that must comply with SOX, not just firms with material internal control weaknesses. This study also uses a longer period of time in the post-SOX period than previous studies. Furthermore, this longer time period allows for the firm specific estimation of earnings quality and for the full impact of SOX to be incorporated into reported earnings. Finally, this study investigates the association of changes in earnings quality with changes in firm specific characteristics to identify which firms benefit the most from SOX.

V. METHODS & HYPOTHESIS DEVELOPMENT

The Primary Model

Dechow and Dichev (2002) develop a model to measure accruals and earnings quality. Earnings quality is measured as the standard deviation of firm specific estimation errors from a model estimating changes in working capital with past, present and future

cash flows from operations. A synopsis of Dechow and Dichev (2002) can be found in Section III of this thesis. Naiker and Navissi (2004) and Machuga and Teitel (2007) use this model to test for changes in earnings quality in different time periods. This model assumes that given perfect knowledge about the past, present and future, cash flows, a firm's change in working capital in the current period can be estimated. The estimation errors reflect both intentional and unintentional management errors. The greater the errors, the lower the accruals and earnings quality. Firm specific accruals quality is estimated in both the pre- and post-SOX periods. Examining the origination and reversal of working capital accruals, this method captures discretionary accruals and management's manipulations of earnings (Jones 1991). Consequently, the changes in accruals quality can be used as a measure of the changes in the underlying earnings quality (Naiker and Navissi 2006 and Machuga and Teitel 2007). The annual empirical model developed by Dechow and Dichev (2002) is modified to a quarterly model by incorporating additional cash flow periods (Naiker and Navissi 2004).

$$\Delta WC_t = \beta_0 + \beta_1 CFO_{t-3} + \beta_2 CFO_{t-2} + \beta_3 CFO_{t-1} + \beta_4 CFO_t + \beta_5 CFO_{t+1} + \beta_6 CFO_{t+2} + \beta_7 CFO_{t+3} + \varepsilon_t \quad (3)$$

where ΔWC_t refers to the change in working capital accruals in quarter t and is computed as the changes in accounts receivable, inventory and other assets less that changes in accounts payable and taxes payable; CFO are cash flows from operations in specific time periods (eg. $t, t-1, t+1$); and ε_t is the residual accrual estimation error, which measures the quality of accruals (Dechow and Dichev 2002).

To measure the change in the quality of accruals, this thesis compares the standard deviation of errors (ε_t) in the pre- and post-SOX periods. The smaller the

standard deviation, the greater the relationship is between the change in working capital and the cash flows from operations (Dechow and Dichev 2002). Firm specific estimation of changes in accruals quality controls for firm specific variations in accruals quality and captures the effect of SOX. If earnings quality increases as a result of SOX, then this thesis expects the standard deviation of the errors to decrease from the pre- to the post-SOX periods as both intentional and unintentional errors are reduced.

The main hypothesis of this thesis is that the passage of SOX improves the quality of earnings from the pre- to the post-SOX periods. If SOX has resulted in management and auditors reducing errors in accruals, then this thesis expects that the sample of firms included would undergo an increase in the quality of accruals and earnings after the introduction of SOX requirements. By ensuring the accuracy and reliability of the financial statements in the post-SOX period, SOX will have achieved its goal of increasing corporate confidence. Consistent with the SEC's objective that SOX will improve the quality of financial statements, this thesis hypothesizes that SOX improved the quality of accruals and earnings in the post-SOX period.

Hypothesis 1: The quality of earnings in the post-SOX periods will be higher than in the pre-SOX periods.

The Secondary Model

In order to investigate further the changes in earnings quality surrounding SOX, the association of changes in firm specific characteristics with changes in earnings quality is estimated. The firm specific characteristics investigated include market adjusted

cumulative abnormal stock returns during the seven month deliberation period, code of ethics disclosure, firm size, and auditor. The following equation is estimated:

$$\Delta EQ_{\Delta} = \beta_0 + \beta_1 CAR_{legislative} + \beta_2 ETHICS_{pre} + \beta_3 SIZE_{pre} + \beta_4 AUD_{pre} + \beta_5 LEV_{pre} + \beta_6 NEG EARN_{\Delta} + \beta_7 SDSALE_{\Delta} + \varepsilon_t \quad (4)$$

where, ΔEQ_t refers to the change in earnings quality estimated using model (1), CAR is the cumulative abnormal stock returns during the seven month legislation period ending July of 2002 and ETHICS refers to a dummy variable set equal to 1 if the firm discloses a code of ethics in the firm's proxy statement in the pre-SOX period and equal to 0 otherwise; SIZE indicates the size of the firm measured as the log of average total assets during the pre-SOX period; AUD is a dummy variable set equal to 1 if the auditor is Arthur Andersen in the pre-SOX period and equal to 0 otherwise; and LEV, NEGEARN, and SDSALE are control variables equal to the change in average leverage of the firm, proportion of negative earnings of the firm and the change in the standard deviation of sales from the pre- to post-SOX periods. These control variables are included because Dechow and Deichev (2002) document that earnings quality is associated with them.

The first variable that is investigated is the firm specific stock return related to the passage of SOX. If SOX is perceived to provide additional public investor protection, then firms should experience, on average, positive stock returns during the legislation period according to Jain and Rezaee (2006) and Naiker and Navissi (2004). In addition, Jain and Rezaee (2006) find the association to be more positive for firms with efficient corporate governance and audit committees in the pre-SOX period. Naiker and Navissisi (2004) find a positive association between cumulative abnormal stock returns and earnings quality. Conversely, the results of Chhaochharia and Grinstein (2007) suggest that the market identifies firms that benefit the most, or have to change the most, in

response to SOX. Firms that already have high earnings quality should not be greatly affected by SOX and the market should have more positive market returns and smaller changes in earnings quality. Conversely, firms that have low earnings quality are expected to benefit the most from the implementation of SOX and should have less positive, or negative, stock returns during the deliberation period and greater increases in earning quality.

The conflicting results may be a result of different time periods being measured, where Jain and Rezaee (2006) and Naiker and Navissi (2004) use a longer period of time surrounding the passage of SOX to accumulate returns, while Chhaochharia and Grinstein (2007) evaluate the rule announcement period of July 30, 2002. Because of these conflicting results, this thesis hypothesizes an association between earnings quality and cumulative abnormal stock returns.

Hypothesis 2: There is an association between cumulative abnormal stock returns during SOX legislative process and changes in the quality of earnings surrounding the impact of SOX.

The second variable that is investigated is the level of corporate governance in the pre-SOX period. The code of ethics in the pre-SOX period is used to proxy for the level of corporate governance. If a code of ethics is (is not) disclosed in the proxy statements in the pre-SOX period, then the firm is considered to have a high (low) level of corporate governance. Bryan, Liu and Tiras (2004) find that firms with a code of ethics and ethical standards for audit committees have higher earnings quality. This thesis expects,

therefore, that firms with no disclosure of a code of ethics during the pre-SOX period experience greater improvements to earnings quality in response to SOX.

Hypothesis 3: Firms with no disclosure of a code of ethics experience greater improvements in the quality of earnings in response to SOX than firms with a code of ethics.

Third, firm size is examined in relation to the passage of SOX. Because larger firms have an abundance of resources and capital to have established audit committees, implement ethics committees, hire top notch auditors, and install other internal controls to ensure the quality of their financial statements, it is less likely that SOX's requirements will significantly affect their practices. Conversely, smaller firms with less resources and minimal segregation of duties are prone to be victims of earnings management since they are able to retain private information more successfully than their larger counterparts (Naiker and Navissi 2004). Thus, these firms are likely to experience greater changes in response to SOX's requirements resulting in an improved quality of their financial statements. Using the log of total assets to measure firm size, this thesis expects that smaller firms experience greater improvements to earnings quality in response to SOX than larger firms.

Hypothesis 4: Smaller firms experience greater improvements in the quality of earnings in response to SOX than larger firms.

Firm auditor is the last variable that this thesis investigates. On average, there is an assumption that the larger, international audit firms provide audit services at a higher standard than smaller, regional or national firms. However, each large auditor may not produce the same quality. Fuerman (2004) finds that Arthur Andersen produces lower quality audits than other large audit firms. This thesis expects, therefore, that firms that employed Arthur Andersen in the pre-SOX period experience greater improvements in earnings quality in response to SOX.

Hypothesis 5: Firms who employed Arthur Anderson as an auditor in the pre-SOX period experienced greater improvements in the quality of earnings in response to SOX than firms that employ other auditors.

Lastly, this paper hypothesizes a relation between earnings quality and firm specific characteristics. By looking at the changes in the variables from the pre-SOX to post-SOX period, this paper includes additional controls that can be put in place to strengthen the results. It is estimated that lower earnings quality is associated with smaller firms, larger magnitude of sales, cash flow, accruals and earnings volatility, and larger frequency of reporting negative earnings (Dechow and Dichev 2002).

VI. THE SAMPLE

The Data

Table 2 summarizes the sample selection process. The majority of data used in the models was compiled from COMPUSTAT, which consists of twenty years of annual data

TABLE 2
Derivation & Composition of Sample

Panel A: Time-Line of Years Included in Sample

Pre-SOX		Not Included			Post-SOX			
4 years or 16 quarters					4 years or 16 quarters			
1998	1999	2000	2001	2002	2003	2004	2005	2006

Panel B: Derivation of Sample

Firm quarter observations for the S&P 500 firms from the eight year window surrounding 2002*	16,000
Firm quarter observations with available cash from operations, earnings, and working capital data	11,802
Firm quarter observations remaining after requiring each firm to have a minimum of eight quarters of information in both the pre- and post-SOX periods	11,540
Firm quarter observations remaining after requiring each firm to have an earnings quality measure in both the pre- and post-SOX periods	10,927
Firms in final sample of <i>H1</i>	369
Firms in final sample of <i>H2-H5</i>	357
All data is from Compustat.	

Panel C: Industry Composition of Sample

Industry	<u>No. of Firms in S&P 500</u>	<u>%</u>	<u>No. of Firms in Sample</u>	<u>%</u>
Mining and construction	27	5.4	24	6.5
Tobacco, textile, apparel, wood, paper, and chemical products	97	19.4	84	22.8
Plastic, stone, clay, glass and concrete materials, rubber, leather, metals, electronics, and computers	118	23.6	104	28.2
Transportation and transit, postal services, water equipment, pipe lines, communications, electric, gas and sanitary services	63	12.6	23	6.2
Durable and non-durable goods, building materials, food, auto detailers, gas stations, apparel and accessory stores, and furniture and equipment stores	49	9.8	44	11.9
Depository institutions, credit institutions, insurance carriers, banks, real estate agencies, security and commodity brokers	96	19.2	46	12.5
Lodging, personal services, business services, motion pictures, and amusement and recreation services	40	8.0	35	9.5
Health, legal, educational and social services, museums, galleries, and gardens	8	1.6	7	1.9
Government organizations, public order, safety, taxation, administrative services, security and international affairs	2	0.4	2	0.5

and ten years of quarterly data for all public firms in the United States collected from SEC filings. In addition, information regarding the code of ethics and audit committee composition in the pre-SOX period were hand-collected from proxy statements filed for the fiscal year ending 2001 and issued in the first fiscal quarter of 2002. Because all firms in the S&P 500 have independent audit committees and include a financial expert in accordance with SOX, in the pre-SOX period, the audit committee variable was dropped from the analysis. *Panel A* presents the time line of years and quarters included in this study. The firm specific earnings quality measure is estimated using quarterly data from the four years prior and subsequent to SOX. In order to prevent the SOX deliberation period from contaminating results, the sample excludes all fiscal years ending in 2002.

Panel B presents the derivation of the firm-specific observations in the sample. Starting off with S&P500 firms with 16 quarters in the pre-SOX period and 16 quarters in the post-SOX period, this thesis begins with 16,000 firm quarter observations. This number drops to 11,802 after eliminating firms without available cash flows from operations, earnings and working capital data. Next, this thesis requires that firms have a minimum of eight quarters of information in both the pre- and post-SOX periods, reducing the number of firm quarter observations down to 11,540. The final sample of firm quarter observations is 10,927 after requiring firms to have an earnings quality measure in both the pre- and post-SOX periods. The total number of firms in the final sample to test *H1* is 369 firms. The sample is further reduced to 357 firms when testing *H2- H5* because of missing stock returns.

Commonly distinguished as the leading United States market indicator, the S&P 500 is comprised of leading firms in eminent industries within the United States

economy. This study uses the S&P 500 firms only as the initial sample due to the fact that only large firms must comply with the Section 404 internal control requirement of SOX. Smaller firms do not have to comply until 2008. Covering about 75% of the United States equities market, the S&P 500 has a minimum market capitalization of \$5 billion. The S&P 500 includes a wide range of industries including energy, materials, industrials, consumer discretionary, consumer staples, health care, financial institutes, information technology, telecommunications services and utilities.³ *Panel C* presents the industry composition of the S&P 500 and the sample. The final sample has similar industry composition as the S&P 500 except for the regulated industries such as transportation and financial institutions. These regulated industries have different reporting requirements and do not prepare a statement of cash flows. As a result, they are excluded from the sample. Finally, because the firms used in this analysis are from the S&P 500, this thesis recognizes that the results may not be applicable to all firms.

Descriptive Statistics

Descriptive statistics on the final sample of firm quarter observations are presented in Table 3. *Panel A* presents the descriptive statistics for the full sample. The descriptive statistics are consistent with those reported in Dechow and Dichev (2002) and Naiker and Navissi (2004). Specifically, cash flows from operations and changes in working capital are positive and are of relatively the same magnitude given that this thesis looks at

³ Information regarding the composition of S&P 500 firms was obtained from the Standard & Poor's website at www.standardandpoors.com.

TABLE 3
Descriptive Statistics

Panel A: Descriptive Statistics: Total (10,927 firm-quarter observations)

	<u>Mean</u>	<u>Standard Deviation</u>	<u>Lower Quartile</u>	<u>Median</u>	<u>Upper Quartile</u>
Cash flow from operations (CFO)	0.029	0.038	0.011	0.026	0.046
Change in working capital (Δ WC)	0.007	0.047	-0.009	0.003	0.019
Earnings before long-term accruals (Earn)	0.036	0.050	0.014	0.030	0.052
Earnings before extraordinary items (Prof)	0.016	0.036	0.007	0.016	0.028
Accruals (Prof-CFO)	-0.013	0.041	-0.025	-0.011	0.001
Total Assets (in millions)	25,563	88,799	2,675	6,175	16,548

Panel B: Descriptive Statistics: Pre-Sarbanes Oxley Period (5,754 firm-quarter observations)

	<u>Mean</u>	<u>Standard Deviation</u>	<u>Lower Quartile</u>	<u>Median</u>	<u>Upper Quartile</u>
Cash flow from operations (CFO)	0.029	0.042	0.010	0.027	0.047
Change in working capital (Δ WC)	0.007	0.052	-0.011	0.003	0.021
Earnings before long-term accruals (Earn)	0.037*	0.056	0.012	0.030	0.054
Earnings before extraordinary items (Prof)	0.015*	0.044	0.006	0.015*	0.028
Accruals (Prof-CFO)	-0.014*	0.049	-0.027	-0.011*	0.002
Total Assets (in millions)	19,315*	61,084	2,076	4,851*	13,947

* Difference across time periods is significant at <0.05 level.

Panel C: Descriptive Statistics: Post-Sarbanes Oxley Period (5,173 firm-quarter observations)

	<u>Mean</u>	<u>Standard Deviation</u>	<u>Lower Quartile</u>	<u>Median</u>	<u>Upper Quartile</u>
Cash flow from operations (CFO)	0.029	0.033	0.011	0.026	0.044
Change in working capital (Δ WC)	0.006	0.040	-0.008	0.004	0.018
Earnings before long-term accruals (Earn)	0.034*	0.042	0.014	0.030	0.050
Earnings before extraordinary items (Prof)	0.018*	0.024	0.008	0.016*	0.028
Accruals (Prof-CFO)	-0.011*	0.031	-0.023	-0.010*	0.001
Total Assets (in millions)	32,513*	111,426	3,577	8,015*	20,658

* Difference across time periods is significant at <0.05 level.

Panel D: Descriptive Statistics: Cross Sectional Model (357 firm observations)

	<u>Mean</u>	<u>Standard Deviation</u>	<u>Lower Quartile</u>	<u>Median</u>	<u>Upper Quartile</u>
<i>Control Variables</i>					
Cumulative market adjusted abnormal stock returns (CAR)	-0.004	0.324	-0.107	0.050	0.193
Average log of total assets (SIZE)	8.661	1.380	7.636	8.510	9.536
Average leverage (LEV)	1.208	3.828	0.256	0.600	1.088
Changes in proportion of negative earnings (NEGEARN)	-0.035	0.149	-0.116	0.000	0.000
Change in standard deviation of sales (SDSALE)	163.122	708.111	-36.123	40.419	184.607
<i>Changes in Indicator Variables</i>					
	<u>n</u>	<u>%</u>			
Firms disclosing a code of ethics (ETHICS)	66	18.5			
Firms with Arthur Andersen as auditor (AUD)	114	31.9			

Variable Definitions:

Cash flow from operations (CFO)	=	Compustat item Q108;
Change in working capital (Δ WC)	=	Δ AR (Compustat item Q103) + Δ Inventory (Compustat item Q104) – Δ AP (Compustat item Q105) – Δ TP (Compustat item Q106) + Δ Other Assets (net) (Compustat item Q107), where AR is accounts receivable, AP is accounts payable, and TP is taxes payable;
Earnings before long-term accruals (Earn)	=	CFO + Δ WC;
Earnings before extraordinary items (Prof)	=	item Q8 from Compustat;
Accruals	=	Prof – CFO;
Proportion of Negative Earnings (NEGEARN)	=	The change in the number of firm years with negative earnings divided by the total number of firm years for each firm;
Standard deviation of Sales (SDSALE)	=	The change in standard deviation of sales from pre- to post-SOX periods; and
CAR	=	the cumulative market adjusted abnormal stock returns during the legislation period from January to July 2002;
ETHICS	=	1 if a firm's code of ethics is in place and disclosed in the firm's proxy statement in the pre-SOX period;
SIZE	=	Log of average total assets during the pre-SOX period;
AUD	=	1 if the firm auditor is Arthur Andersen in the pre-SOX period;

CFO, Δ WC, Earn, Prof and Accruals are scaled by average total assets

quarterly data while the prior papers look at annual data. In addition, this sample consists of S&P 500 firms. Therefore, the total assets are bigger than in prior research. Earnings before long-term accruals (0.036) exceed cash flows from operations (0.029), signifying that short-term accruals are primarily positive since firms increase working capital in order to expand. Furthermore, the average accruals are negative (-0.013), primarily because of depreciation.

The goal of this model is to isolate earnings quality and measure its change over different time periods. *Panels B* and *C* present the descriptive statistics for the pre- and

post-SOX periods, respectively. The pattern described for the full sample holds in both periods. Tests of differences in means and medians across the two time periods indicate that both cash flows and changes in working capital are not significantly different. However, total accruals and therefore both earnings and profits are different across the two time periods. This univariate analysis suggests that accruals have changed from the pre- to post-SOX period.

Panel D presents the descriptive statistics for the firm level variables included in model (4) to test *H2-H5*. Cumulative abnormal returns, or CAR, are not significant during the legislative period. As expected and consistent with Table 3, total assets increase from the pre- to post-SOX periods. Dechow and Dichev (2002) finds significant associations between earnings quality and the proportion of negative earnings and the standard deviation of sales. In this study, the proportion of negative earnings decreases but the standard deviation of sales increases from the pre- to post-SOX periods. These changes have offsetting effects on earnings quality. Finally, the number and percentage of firms disclosing a code of ethics and using Arthur Andersen in the pre-SOX period are presented at the bottom of the table. A code of ethics is disclosed by 18.5% of firms in the pre-SOX period and 31.9% of firms employ Arthur Andersen in the pre-SOX period.

The Pearson Correlations

The Pearson correlations among variables for the full sample and by time period are presented in Table 4 and are consistent with Dechow and Dichev (2002) and Naiker and Navissi (2004). *Panel A* presents correlations among variables for the total firm quarter observations. *Panels B and C* present the firm quarter observations in the pre- and post-

SOX periods respectively and are consistent with the full sample. Specifically, cash flows from operations are negatively correlated with working capital accruals and

TABLE 4
Correlations among Variables

Panel A: Pearson Correlations: Total (10,927 firm-quarter observations)

	<u>Earn_t</u>	<u>CFO_t</u>	<u>ΔWC_t</u>	<u>CFO_{t+1}</u>	<u>CFO_{t-1}</u>	<u>Earn_{t+1}</u>	<u>Accruals_t</u>
Prof _t	0.327*	0.381*	0.038	0.293*	0.276*	0.230*	0.520*
Earn _t		0.454*	0.695*	0.285*	0.144*	0.093*	-0.136*
CFO _t			-0.325*	0.159*	0.154*	0.149*	-0.591*
ΔWC _t				0.175*	0.028	-0.023	0.336*
CFO _{t+1}					0.261*	0.455*	0.109*
CFO _{t-1}						0.194*	0.098*
Earn _{t+1}							0.063*

Panel B: Pearson Correlations: Pre-Sarbanes Oxley Period (5,754 firm-quarter observations)

	<u>Earn_t</u>	<u>CFO_t</u>	<u>ΔWC_t</u>	<u>CFO_{t+1}</u>	<u>CFO_{t-1}</u>	<u>Earn_{t+1}</u>	<u>Accruals_t</u>
Prof _t	0.320*	0.369*	0.044	0.299*	0.295*	0.231*	0.585*
Earn _t		0.464*	0.700*	0.286*	0.155*	0.130*	-0.116*
CFO _t			-0.308*	0.194*	0.204*	0.152*	-0.538*
ΔWC _t				0.151*	0.002	0.017*	0.312*
CFO _{t+1}					0.286*	0.465*	0.101*
CFO _{t-1}						0.205*	0.089*
Earn _{t+1}							0.076*

Panel C: Pearson Correlations: Post-Sarbanes Oxley Period (5,173 firm-quarter observations)

	<u>Earn_t</u>	<u>CFO_t</u>	<u>ΔWC_t</u>	<u>CFO_{t+1}</u>	<u>CFO_{t-1}</u>	<u>Earn_{t+1}</u>	<u>Accruals_t</u>
Prof _t	0.362*	0.433*	0.025	0.293*	0.238*	0.237*	0.317*
Earn _t		0.436*	0.683*	0.285*	0.1524*	0.018	-0.180*
CFO _t			-0.359*	0.094*	0.060*	0.142*	-0.718*
ΔWC _t				0.220*	0.080*	-0.096*	0.396*
CFO _{t+1}					0.215*	0.436*	0.127*
CFO _{t-1}						0.172*	0.120*
Earn _{t+1}							0.033

Panel D: Pearson Correlations: Cross Sectional Model (357 firm observations)

	<u>CAR</u>	<u>AUD</u>	<u>LEV</u>	<u>SIZE</u>	<u>ETHICS</u>	<u>Δ NEG EARN</u>	<u>Δ SD SALE</u>
<u>ΔEQ</u>	-0.0189*	0.025	-0.064	-0.193*	-0.076	-0.219*	-0.053
<u>CAR</u>		0.038	-0.010	-0.011	0.029	-0.211*	0.100
<u>AUD</u>			0.089	0.001	-0.001	0.022	-0.015
<u>ΔLEV</u>				0.283*	0.030	0.035	0.122
<u>ΔSIZE</u>					0.167	0.108	0.192*
<u>ETHICS</u>						0.002	0.018
<u>ΔNEGEARN</u>							-0.040

* Significant at the <0.001 level.

Variable Definitions:

Cash flow from operations (CFO)	=	Compustat item Q108;
Change in working capital (ΔWC)	=	ΔAR (Compustat item Q103) + ΔInventory (Compustat item Q104) – ΔAP (Compustat item Q105) – ΔTP (Compustat item Q106) + ΔOther Assets (net) (Compustat item Q107), where AR is accounts receivable, AP is accounts payable, and TP is taxes payable;
Earnings before long-term accruals (Earn)	=	CFO + ΔWC;
Earnings before extraordinary items (Prof)	=	item Q8 from Compustat; and
Accruals	=	Prof – CFO.
Proportion of Negative Earnings (NEGEARN)	=	The change in the number of firm years with negative earnings divided by the total number of firm years for each firm;
Standard deviation of Sales (SDSALE)	=	The change in standard deviation of sales from pre- to post-SOX periods; and
CAR	=	the cumulative market adjusted abnormal stock returns during the legislation period from January to July 2002;
ETHICS	=	1 if a firm's code of ethics is in place and disclosed in the firm's proxy statement in the pre-SOX period;
SIZE	=	Log of average total assets during the pre-SOX period;
AUD	=	1 if the firm auditor is Arthur Andersen in the pre-SOX period;

CFO, ΔWC, Earn, Prof and Accruals are scaled by average total assets

positively correlated with past and future cash flows from operations. There is a positive correlation between earnings before long-term accruals and cash flows from operations and earnings before long-term accruals and change in working capital. This pattern indicates that working capital accruals capture most of the variation in total accruals.

Panel D presents the correlations of firm level variables to test H2-H5. There is a significant positive correlation between change in earnings quality and size, and cumulative abnormal stock returns and changes in the proportion of negative earnings. No other correlations are significant.

VII. RESULTS

Empirical Measure of Accrual Quality

Table 5 presents the results of both firm-specific and pooled regressions of changes in working capital accruals on past, current, and future cash flows from operations. The results are further broken down by time period, where *Panel A* presents the estimation results for the total time period from 1999-2006, *Panel B* presents the estimation results for the pre-SOX time period from 1999-2001 and *Panel C* shows the post-SOX time period from 2003-2006. The firm specific results are the most relevant as our model is defined and most naturally applied on a firm-level basis. Furthermore, because the regression coefficients are likely to differ across firms resulting from operating cash flow proxies containing measurement errors systematically related to firm characteristics, this thesis concludes that firm-level regressions provide more accurate results than a cross-sectional regression. The pooled regressions are included for comparative purposes.

Similar to the univariate results in Table 4, the firm-specific results in Table 5 are consistent with the theoretical predictions of Dechow and Dichev (2002). Current changes in working capital are negatively associated with current cash flows from operations and positively associated with past cash flows from operations in both the firm specific and pooled estimations in all panels. The association with future cash flows is not significant in the firm specific estimations but is significantly positive in the pooled estimations in all panels.

TABLE 5
Firm Specific Regressions of the Change in Working Capital on Past, Current and Future Cash Flows from Operations

$$\Delta WC_t = \beta_0 + \beta_1 CFO_{t-3} + \beta_2 CFO_{t-2} + \beta_3 CFO_{t-1} + \beta_4 CFO_t + \beta_5 CFO_{t+1} + \beta_6 CFO_{t+2} + \beta_7 CFO_{t+3} + \varepsilon_t \quad (3)$$

	<u>Intercept</u>	<u>CFO_{t-3}</u>	<u>CFO_{t-2}</u>	<u>CFO_{t-1}</u>	<u>CFO_t</u>	<u>CFO_{t+1}</u>	<u>CFO_{t+2}</u>	<u>CFO_{t+3}</u>	<u>AdjustedR²</u>
<i>Panel A: Total (738 firms and 10,927 firm-quarter observations)</i>									
<i>Firm Specific Estimations</i>									
Mean	0.007	0.179	0.087	0.052	-0.396	-0.014	-0.038	-0.017	0.022
(t-statistic)	(2.903)	(2.928)	(2.406)	(1.684)	(-13.179)	(-0.177)	(-0.566)	(-0.625)	
Lower Quartile	-0.012	-0.151	-0.217	-0.203	-0.868	-0.236	-0.214	-0.264	0.008
Median	0.005	0.072	0.034	0.039	-0.412	0.028	0.017	-0.010	0.015
Upper Quartile	0.029	0.367	0.308	0.284	0.036	0.333	0.265	0.222	0.028
<i>Pooled Estimations</i>									
Coefficient	0.008	0.181	0.015	0.003	-0.476	0.144	0.062	0.011	0.173
(t-statistic)	(7.43)	(6.12)	(0.57)	(0.12)	(-9.86)	(4.83)	(2.53)	(0.44)	
<i>Panel B: Pre-Sarbanes Oxley Period (369 firms and 5,754 firm-quarter observations)</i>									
<i>Firm Specific Estimations</i>									
Mean	0.106	0.106	0.064	0.067	-0.394	0.086	0.034	-0.010	0.026
(t-statistic)	(2.176)	(3.069)	(2.005)	(1.413)	(-8.623)	(2.249)	(0.930)	(-0.234)	
Lower Quartile	-0.151	-0.151	-0.206	-0.215	-0.871	-0.216	-0.211	-0.261	0.010
Median	0.074	0.074	0.024	0.017	-0.383	0.039	-0.000	-0.020	0.017
Upper Quartile	0.334	0.334	0.277	0.250	0.049	0.342	0.247	0.211	0.031
<i>Pooled Estimations</i>									
Coefficient	0.010	0.178	-0.003	-0.007	-0.462	0.135	0.076	-0.003	0.155
(t-statistic)	(6.58)	(4.62)	(-0.09)	(-0.20)	(-13.97)	(3.28)	(2.31)	(-0.10)	
<i>Panel C: Post-Sarbanes Oxley Period (369 firms and 5,173 firm-quarter observations)</i>									
<i>Firm Specific Estimations</i>									
Mean	0.253	0.253	0.110	0.036	-0.398	-0.113	-0.111	-0.025	0.018
(t-statistic)	(1.929)	(2.153)	(1.695)	(0.930)	(-10.179)	(-0.765)	(-0.852)	(-0.682)	
Lower Quartile	-0.147	-0.147	-0.260	-0.195	-0.862	-0.271	-0.226	-0.263	0.007
Median	0.070	0.070	0.037	0.078	-0.444	0.015	0.038	-0.003	0.014
Upper Quartile	0.406	0.406	0.328	0.322	0.031	0.321	0.282	0.230	0.024
<i>Pooled Estimations</i>									
Coefficient	0.005	0.192	0.066	0.029	-0.499	0.158	0.029	0.023	0.211
(t-statistic)	(5.31)	(5.94)	(2.10)	(0.82)	(-16.68)	(4.66)	(0.89)	(0.76)	

Variable Definitions:	
Cash flow from operations (CFO)	= Compustat item Q108;
Change in working capital (ΔWC)	= ΔAR (Compustat item Q103) + $\Delta Inventory$ (Compustat item Q104) – ΔAP (Compustat item Q105) – ΔTP (Compustat item Q106) + $\Delta Other Assets (net)$ (Compustat item Q107), where AR is accounts receivable, AP is accounts payable, and TP is taxes payable;

All variables are scaled by average total assets.

Results of Tests of Hypotheses

Table 6 presents the results of the tests of the hypotheses. *Panel A* presents the main hypothesis test. The descriptive statistics for earnings quality changes are consistent with *H1*. The mean (median) standard deviation of the residuals is 0.057 (0.044) in the pre-SOX period and declines to 0.044 (0.030) in the post-SOX period. The changes in the mean and median are significant at the <0.001 level. The decrease in the standard deviation of the residuals indicates that earnings quality has increased.

Panel B presents the tests hypotheses *H2-H5*. The change in earnings quality is regressed on firm specific characteristics. The beta coefficients are presented in the table. As a result, the intercept is not reported. The coefficient estimates on ETHICS, SIZE and AUD are all in the expected direction, however, only SIZE is statistically significant. Size is the average log total assets from the pre-SOX period. The negative coefficient estimate means that a one standard deviation decrease in log assets results in a 0.150 standard deviation increase in earnings quality or a 0.005 increase in earnings quality.

TABLE 6
Tests of Hypotheses

Panel A: Descriptive Statistics for Earnings Quality and the Change in Earnings Quality for 369 firms

$$\Delta WC_t = \beta_0 + \beta_1 CFO_{t-3} + \beta_2 CFO_{t-2} + \beta_3 CFO_{t-1} + \beta_4 CFO_t + \beta_5 CFO_{t+1} + \beta_6 CFO_{t+2} + \beta_7 CFO_{t+3} + \varepsilon_t \quad (3)$$

	<u>Firm Specific Standard Deviation of Residuals in the Full Sample</u>	<u>Firm Specific Standard Deviation of Residuals in the Pre-SOX Period</u>	<u>Firm Specific Standard Deviation of Residuals in the Post-SOX Period</u>	<u>Δ in the Standard Deviation of Residuals</u>	<u>P-Value Test of Change from Pre- to Post- SOX</u>
Mean	0.050	0.057	0.044	0.013	<0.001
Standard Deviation	0.051	0.055	0.045	0.034	
Lower Quartile	0.022	0.025	0.020	-0.002	
Median	0.036	0.042	0.030	0.008	<0.001
Upper Quartile	0.061	0.065	0.055	0.020	

The standard deviation of the residuals (*sresid*) is calculated based on the residuals from the 369 firm-specific estimations of (1):

Variable Definitions:

Cash flow from operations (CFO) = Compustat item Q108;
Change in working capital (ΔWC) = ΔAR (Compustat item Q103) + ΔInventory (Compustat item Q104) – ΔAP (Compustat item Q105) – ΔTP (Compustat item Q106) + ΔOther Assets (net) (Compustat item Q107), where AR is accounts receivable, AP is accounts payable, and TP is taxes payable;

All variables are scaled by average total assets.

Panel B: Regression of Changes in Earnings Quality on Firm Specific Characteristics and Supporting Hypotheses for 357 firms

$$\Delta EQ_{\Delta} = \beta_0 + \beta_1 CAR_{legislative} + \beta_2 ETHICS_{pre} + \beta_3 SIZE_{pre} + \beta_4 AUD_{pre} + \beta_5 LEV_{pre} + \beta_6 NEGEARN_{\Delta} + \beta_7 SDSALE_{\Delta} + \varepsilon_t \quad (4)$$

	<u>Expectation</u>	<u>Beta Coefficient</u>	<u>(t-statistic)</u>	<u>p-value</u>
CAR	?	-0.245	(-3.89)	<0.001
ETHIC	-	-0.042	(-0.96)	0.169
SIZE	-	-0.150	(-2.06)	0.020
AUD	+	0.042	(0.85)	0.199
LEV	?	-0.035	(-0.98)	0.329
NEGEARN	?	-0.257	(-2.38)	0.018
SDSALE	?	-0.005	(-0.20)	0.845
Adjusted R-squared		0.138		

Variable Definitions:

ΔEQ	=	The change in standard deviation of residuals from firm specific estimation of model (1) in the pre- and post-SOX periods;
CAR	=	the cumulative market adjusted abnormal stock returns during the legislation period from January to July 2002;
ETHICS	=	1 if a firm's code of ethics is in place and disclosed in the firm's proxy statement in the pre-SOX period;
SIZE	=	Log of average total assets during the pre-SOX period;
AUD	=	1 if the firm auditor is Arthur Andersen in the pre-SOX period;
LEV	=	Average debt to book value of equity ratio from the pre-SOX period;
Proportion of Negative Earnings (NEG EARN)	=	The number of firm years with negative earnings divided by the total number of firm years for each firm;
Standard deviation of Sales (SD SALE)	=	The change in standard deviation of sales from pre- to post-SOX periods; and

This thesis predicts an unspecified relationship between CAR and changes in earnings quality. CAR is significantly negatively associated with changes in earnings quality and has a greater impact on earnings quality than size. A one standard deviation decrease in CAR increases the change in earnings quality by 0.008. Ethics has a marginally significant negative association with changes in earnings quality. A company that discloses a code of ethics has a change in earnings quality of 0.001 less than a firm that does not disclose a code of ethics. Firms disclosing codes of ethics have high earnings quality in the pre-SOX period and earnings quality does not increase as a result of SOX. Finally, consistent with Dechow and Dichev (2002), firms with decreasing proportions of negative earnings have greater changes in earnings quality as the reduced volatility in earnings increases earnings quality. A one standard deviation decrease in the proportion of negative earnings increases the change in earnings quality by 0.009. Contrary to Dechow and Dichev (2002), the change in the standard deviation of sales is not associated with changes in earnings quality.

Sensitivity Tests

In order to ensure the accuracy and robustness of the results, several sensitivity tests are performed. First, all reported results are generated using robust estimation. However,

results without robust estimation are similar and in some cases stronger. Second, the Dechow and Dichev (2002) model is an annual model where changes in working capital are estimated by past, present and future annual cash flows from operations. This paper modified the model to a quarterly setting by estimating the changes in quarterly working capital in quarter t and cash flows from operations for three quarters before and three quarters after t . This expanded model reduces the degrees of freedom available for firm specific estimation. To evaluate the robustness of the results, the firm specific estimations of changes in working capital are regressed on cash flows from operations from quarter $t-1$, t , and $t+1$ only. The untabulated results are qualitatively the same.

Next, the sensitivity of results to potential outliers is assessed. Observations with studentized residuals greater than two are removed. The results did not change. Furthermore, the potential effects of industry are assessed by adding a one digit industry indicator variable to model (4). Including the industry variable does not change the results, nor does it increase the explanatory power of the model. Finally, an indicator variable for firms with adverse opinions on internal controls in the pre-SOX period is added to model (4). The variable is marginally significantly positively associated with the changes in earnings quality indicating that firms with internal control weaknesses increase earnings quality more than firms with no internal control weaknesses.

VIII: SUMMARY

In response to the enactment of SOX after the collapse of several large firms including WorldCom, Enron and Arthur Andersen, this thesis looks at the relationship of SOX with earnings quality and earnings management. Prior to SOX, there was no

legislative body overseeing the audits of public companies, independence was broadly defined, audit committees and testing of internal controls was optional and CEOs and CFOs hold no personal liability for the accuracy of the financial statements. Therefore, earnings management is more likely to occur during the pre-SOX period than the post-SOX period, producing lower quality earnings and financial statements. With the new regulations of SOX designed to place restrictions on public companies and their auditors, earnings quality is anticipated to improve along with the quality of the financial statements, restoring investor confidence in the industry.

The purpose of this study is to investigate the effects of SOX on the quality of financial statements. This paper finds that SOX has increased the accuracy and reliability of the financial statements through improved earnings quality, benefiting the investing community and other users of the financial statements. With fewer opportunities to manage earnings in the post-SOX period, SOX has achieved its goal through increased responsibility on management and the auditors of publicly traded companies. Although SOX benefits currently outweigh the expenses, the SEC is starting to cutback on the requirements to alleviate some of the costs. This could possibly signify that SOX is only a temporary fix to a persistent problem that may disappear in years to come.

After empirically evaluating the effects of SOX on accruals and earnings quality using changes in working capital and cash flows from operations in the S&P 500, this study finds that management generates higher quality of earnings in the post-SOX period. Furthermore, an investigation of the association between firm specific characteristics and earnings quality reveals a significant negative association between earnings quality and firm size and firms with cumulative abnormal stock returns during the legislative period.

Finally, this study finds no association between earnings quality and Arthur Andersen audits in the pre-SOX period. Ultimately, this study indicates that firms had more opportunities to manage earnings prior to the implementation of SOX and benefit from the changes in regulations resulting in improvements in the quality of their financial statements.

Due to the circumstances surrounding SOX, there are several limitations that may affect the results of this thesis. First, the pre-SOX period may be affected by the SEC audit committee rules of 1999, which may increase earnings quality in the pre-SOX period. Second, the demise of WorldCom, Enron and Andersen may have resulted in firms voluntarily increasing earnings quality because of public investor scrutiny in the pre-SOX period. Furthermore, the gradual implementation of SOX makes it difficult to measure the immediate effects of the act. Finally, holding firms to unattainable standards through extreme regulatory parameters may induce firms to choose weaker systems.

With regard to the limitations presented by the data, there are only four years of data in the post-SOX period. This may not be enough time for firms to fully realize the benefits of SOX and result in higher earnings quality. Also, only large publicly traded companies have had to comply with the internal control provision of SOX, which limits the variation across firms and limits the generalizability of the results. Furthermore, time series analyses result in survivorship bias in the sample because firms that experience bankruptcy, merger, or buyouts will not be included. Together, these may have impacted the measure of the changes in earnings quality from the pre-SOX to the post-SOX periods.

SOX has the potential to improve the audit function, earnings quality and financial statements quality by restricting public companies. Within the next year, smaller companies must comply with the internal control regulations of SOX. This thesis suggests further research upon universal firm compliance which measures the effects of SOX on all firms, large and small. In addition, as more time passes from the enactment of SOX, there are more opportunities for firms to increase their quality of earnings and financial statements. Although the results presented in this thesis suggest an improvement in earnings quality, as time passes the quality of earnings may continue to improve even more. Finally, the requirements of SOX impose severe cost implications upon complying firms. Upon further research, this thesis suggests an analysis of the related costs and benefits for compliant firms in the post-SOX period.

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