Assessing Actual Audit Quality

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ABSTRACT

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Prior audit quality research has adopted a variety of measures for audit quality. Since actual audit quality is unobservable before and when the audit is conducted, market-perceived audit quality proxies have been widely used. However, no research has examined whether market-perceived audit quality can appropriately proxy for actual audit quality. This study addresses the research question "does market-perceived audit quality capture actual audit quality?" Using a post hoc identification of "apparent audit failures" as cases of poor actual audit quality, this study examines whether poor actual audit quality is related to higher levels of earnings management and to smaller analysts' forecast errors.

This study uses a matched-pair design, matching each audit failure company with a similar non-audit failure company. In investigating the first research question, value relevance of accounting information is used as the measure of market-perceived audit quality. By comparing value-relevance of accounting information across audit failure and non-audit failure groups, this study documents that accounting information is less value-relevance for audit failure group. This result suggests that the market appears to assess actual audit quality accurately and, therefore, market-perceived audit quality can be used as the proxy for actual audit quality.

Consistent with prior studies, discretionary accruals are estimated to measure earnings management. Compared with the non-audit failure group, the audit failure

group exhibits higher levels of discretionary accruals. The result supports my hypothesis that poor actual audit quality is associated with higher levels of earnings management. The results of this study do not reveal any statistically significant relationship between actual audit quality and financial analysts' forecast errors.

CHAPTER 1: INTRODUCTION

1.1 Introduction

The demand for auditing arises from the auditor's monitoring role in the principal-agent relationship (Eilifsen and Messier, 2000). According to agency theory, an agency relationship is a contract under which one or more principals engage an agent to perform some service on the principals' behalf and delegate some decision-making authority to the agent (Jenson and Meckling, 1976). When there are conflicts between the interests of the principal and the agent, the agent may not act in the best of interests of the principal. In order to avoid or minimize such divergences from his or her interests, the principal can establish monitoring systems. The financial statement audit is a monitoring mechanism that helps reduce information asymmetry and protect the interests of the principals, specifically, stockholders and potential stockholders, by providing reasonable assurance that management's financial statements are free from material misstatements (Watts and Zimmerman, 1986).

The performance quality of this monitoring function may vary. Audit quality describes how well an audit detects and reports material misstatements of financial statements, reduces information asymmetry between management and stockholders and therefore helps protect the interests of stockholders. High audit quality should be associated with high information quality of financial statements because financial statements audited by high quality auditors should be less likely to contain material misstatements. The purpose of this study is to provide a better understanding of audit quality and to assess the validity of auditor size as a proxy for audit quality.

Following DeAngelo's (1981) argument that size of audit firms is positively associated with audit quality, many studies use size (Big 8/6/5 vs. non-Big 8/6/5) as the audit quality proxy (Krishnan, 2003; Zhou and Elder, 2001; Bauwhede *et al.*, 2000; Becker *et al.*, 1998; Hogan, 1997; Clarkson and Simunic, 1994; Firth and Smith, 1992a; Nichols and Smith, 1983). Many audit quality studies indicate that, when accounting firm size is used as the indicator of audit quality, higher audit quality is associated with less information asymmetry and higher information quality. For example, using discretionary accruals as the measure for earnings management, Becker *et al*. (1998) find that audit quality is negatively related to income-increasing discretionary accruals, which indicates that high audit quality is associated with low information asymmetry. Teoh and Wong (1993) find that Big 8 clients are associated with higher earnings response coefficients (ERCs). The ERC is the coefficient on earnings resulting from regressing stock returns on reported earnings. It measures the extent to which the market responds to earnings.

However, whether this size proxy captures both perceived audit quality and actual audit quality is unclear. Perceived audit quality is based on perceptions of financial statement users, while actual audit quality refers to the auditor's ability to detect and report accounting misstatements. Financial statement users lack access to the evidence gathered during the audit process and to the information audited, and thus cannot assess actual audit quality directly. Further, prior research has not clearly distinguished these concepts. Perceived audit quality and actual audit quality will be discussed in more detail later in this study.

Teoh and Wong (1993) indicate that the ERC of companies audited by Big 8 accounting firms is higher than that of companies audited by non-Big 8 auditors. Since the ERC reflects the perception of audit quality by financial statement users, it measures perceived audit quality. Moreover, it has been shown that the perceived audit quality of large accounting firms is higher than that of small accounting firms, so that size can be used as a proxy for perceived audit quality. However, the distinction of the concepts of perceived audit quality and actual audit quality has received little empirical examination. Research has not tested whether the perceived audit quality proxy (i.e., size) also captures actual audit quality.

In order to determine whether a perceived audit quality proxy, namely, auditor size, might also be a suitable proxy for actual audit quality, this study first examines whether the perceived audit quality captures actual audit quality. The study also investigates the relationship between actual audit quality and earnings management. Different from Becker *et al.* (1998), this study uses a post hoc identification of "apparent" audit failures to measure actual audit quality. For the purpose of this study, the term apparent audit failure is defined as a case of material misstatement of financial statements indicated by SEC investigation or subsequent restatement of financial statements. Additionally, prior literature (e.g., Kasznik and McNichols, 2002) indicates that managers have incentives to meet analysts' earnings forecasts through earnings management. This suggests that actual audit quality might be related to analysts' forecast errors. Therefore, this study examines whether actual audit quality, measured by a post hoc identification of apparent audit failures, is related to analysts' forecast errors. This study has implications for regulators, accounting information users, and accounting researchers by providing an enhanced understanding of actual audit quality.

1.2 Perceived Audit Quality, Actual Audit Quality, and the Size Proxy

DeAngelo (1981) defines audit quality as the market-assessed joint probability that a given auditor will both detect material misstatements in the client's financial statements and report the material misstatements. This is a definition of perceived audit quality since DeAngelo (1981) emphasizes the role of the market in assessing audit quality. The willingness to report discovered material misstatements is defined by DeAngelo (1981) as auditor independence. Therefore, according to DeAngelo's (1981) definition, audit quality is a function of the auditor's ability to detect material misstatements (auditor competence) and auditor independence.

Since actual audit quality is unobservable before and when an audit is performed, a valid proxy is needed when investigating the relationships between actual audit quality and other factors. DeAngelo (1981) analytically demonstrates that auditor size has a positive relationship with audit quality, since a large audit firm has "more to lose" by failing to report a discovered material misstatement in a client's records. Following DeAngelo's study, many other studies empirically examine the relationship between auditor size and audit quality (e.g., Krishnan and Schauer, 2000; Colbert and Murray, 1998; and Palmrose, 1988).

Among other potential audit quality measures, such as audit fee and audit hours, auditor firm size commonly is used as a proxy for audit quality. Specifically, researchers often use the dichotomous Big 8/6/5 vs. non-Big 8/6/5 as a quality proxy: Big accounting firms represent high audit quality, and non-Big accounting firms represent low audit quality. As discussed before, this dichotomous proxy captures perceived audit quality. It is unclear whether this proxy also captures actual audit quality.[1] Furthermore, there are two underlying assumptions when using this dichotomous audit quality proxy. The first is that an audit firm supplies a single level of audit quality across different clients at a moment in time and supplies a single level of audit quality across different time periods (Clarkson and Simunic, 1994). The second is that audit quality within one group of accounting firms (Big 8/6/5 accounting firms or non-Big 8/6/5 accounting firms) is homogeneous. These two assumptions appear to be problematic. It is unlikely that an auditor can maintain one level of audit quality for all of its clients and over different periods of time. For instance, an auditor may have expertise in a certain industry and may be able to offer higher audit quality in that industry than in other industries. It is also unlikely that all Big 8/6/5 auditors or all non-Big 8/6/5 auditors offer the same level of audit quality.

The results of studies that test the relationship between audit quality and audit firm size using other proxies for audit quality (e.g., Teoh and Wong, 1993; Palmrose, 1988) usually support the hypothesis that audit quality and audit firm size are positively associated. For instance, Palmrose (1988) tests auditor size and

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[1] Recent audit failures, such as Enron, Waste Management, and WorldCom, cast doubt on a positive relationship between size and actual audit quality as well as perceived audit quality. The largest accounting firms may have lost the perceived association with higher audit quality.

audit quality using litigation activity as the proxy for audit quality. Teoh and Wong (1993) test this relationship using earnings response coefficients to measure audit quality. However, the proxy used in Teoh and Wong's (1993) study may capture only perceived audit quality, an auditor's actual ability to detect and report accounting misstatements. Because actual audit quality is unobservable when audit service is provided, and some period of time must elapse before audit failures become apparent, it might be expedient for researchers to use a perceived audit quality measure. However, if perceived audit quality does not reflect actual audit quality, using financial statement users' perceived audit quality to test the relationship among audit quality and other variables is problematic. Financial statement users may not be able to assess actual audit quality accurately because they do not have access to the audit process. This study provides some insights in evaluating actual audit quality and the validity of the size proxy for audit quality in certain circumstances.

This study is based on a post hoc audit quality evaluation. Apparent audit failures are used as a post hoc evaluation indicating poor actual audit quality. Consistent with the definition presented in section 1.1, apparent audit failures are identified as materially misstated financial statements receiving unqualified audit opinions. Actual audit quality are classified into two categories-"apparent audit failure" and "no apparent audit failure." Several sources are used to identify apparent audit failures. These include the SEC's Accounting and Auditing Enforcement Releases (AAERs), companies restating financial statements because of past misstatements (restatements), and audit failures revealed by litigation against auditors. AAERs indicate companies whose financial statements contain misstatements documented in SEC sanctions of companies or auditors. Restatements include companies that restated prior years' financial statements because of significant misstatements. Restatements represent audit failures because initially auditors did not detect and/or report those material misstatements. Cases of litigation against auditors contain allegations that auditors failed to detect and report material misstatements. Litigation cases that provide convincing evidence of audit failure are included as apparent audit failures.

Using a post hoc identification of apparent audit failures to test the relationship between actual audit quality and perceived audit quality has several advantages. The first advantage is that apparent audit failures represent poor actual audit quality rather than poor perceived audit quality. Furthermore, when using apparent audit failures, two problematic assumptions concerning the size proxy for audit quality are released. Those two assumptions are that: (1) an audit firm supplies a single level of audit quality across clients at a moment in time and across time; and (2) audit quality within the same group of accounting firms is homogeneous. Using cases from AAERs, restatements, and litigation, apparent audit failures are identified for a large number of different auditors including both Big 8/6/5 auditors and non-Big 8/6/5 auditors. One auditor might provide both good and poor quality audits. Moreover, within the Big 8/6/5 audit group or non-Big 8/6/5 audit group, at a certain time one particular auditor might be associated with more audit failures than other auditors. This will show the differentiation of quality within Big 8/6/5 and non-Big 8/6/5 audit groups. Also, testing how actual audit quality is related to other variables indicating financial reporting quality, such as earnings management and analysts' forecast errors, may contribute to existing audit quality research.

1.3 Audit Quality and Earnings Management

As stated earlier, from an agency theory perspective, the audit is a monitoring mechanism that provides reasonable assurance that financial statements are free of material misstatements and therefore protects the interests of stockholders. When the interests of management conflict with the interests of stockholders, management may not act in the best interests of stockholders. Management compensation often is based on reported earnings. In order to maximize their wealth, managers have incentives to manage reported earnings and they often have the ability to do so.

According to Healy and Wahlen (1999), "earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers." If stockholders had perfect information about managers' actions, there would be no information asymmetry between the two parties. Information asymmetry exists when perfect information is absent, which is the assumption of agency theory (Fama, 1980). Since information asymmetry exists, stockholders have difficulty detecting earnings management. Jacobides and Croson (2001) define monitoring as any collection of information by the principal in the agency relationship. An audit is one monitoring mechanism since it helps stockholders to collect reliable information. Auditing serves to reduce information asymmetry, and the reduction in information asymmetry is an indicator of the level of audit quality (Schauer, 2001). Auditors reduce information asymmetry between managers and stakeholders by providing reasonable assurance that the financial statements are free of material misstatements (Becker, *et al*., 1998). High quality audits should be more likely to successfully detect and prevent earnings management. Therefore, higher levels of audit quality should be associated with lower levels of earnings management.

Prior research (e.g., Dechow *et al.*, 1995; Jones, 1991; DeAngelo, 1986; Healy, 1985) has used discretionary accruals to measure earnings management. Actual total accruals consist of two components: non-discretionary accruals and discretionary accruals. Actual total accruals are defined as income before extraordinary items minus operating cash flows (Dechow *et al.*, 1995). Nondiscretionary accruals represent the accruals that would be recorded without any incentives to manage earnings and are estimated from an accrual prediction model (Thomas and Zhang, 2000). Discretionary accruals, management's vehicle for managing earnings, are calculated as the difference between fitted values of the prediction model and actual total accruals.

Prior research provides evidence that high audit quality[2] measured by auditor size is associated with low discretionary accruals. Becker *et al.* (1998) find that audit quality, measured by a Big 6 vs. non-Big 6 dichotomous variable, is negatively related to positive discretionary accruals (income-increasing earnings

[2] Prior research has not clearly distinguished the concepts of actual audit quality and perceived audit quality.

management). However, using the same measurement basis, Bauwhede *et al*. (2000) indicate that audit quality is a constraint on income-decreasing earnings management but not on income-increasing earnings management. The conflicting results may suggest that the size proxy might not always capture actual audit quality. This study provides evidence about the relationship between actual audit quality and earnings management measured by discretionary accruals, using the sample of apparent audit failures discussed above.

1.4 Audit Quality and Analysts' Forecast Errors

Managers have incentives to meet both management's earnings forecasts and analysts' earnings forecasts. As indicated in the analyses of AAERs from 1997-1999 (Public Oversight Board, 2000), two possible incentives for misstating financial statements are "meeting analysts' expectations" and "meeting corporate earnings targets," which reflect analysts' earnings forecasts and management's earnings forecasts respectively. Whether reported earnings meet management's earnings forecasts may affect the company's stock price, because the ability to reach management's earnings forecasts is often the signal to the market that the company is stable and healthy. If a company cannot meet its earnings forecasts, its stock price may go down because of the unfavorable signal to the market.

In addition to the incentive to minimize the difference between management's earnings forecasts and reported earnings, managers also have the incentive to meet analysts' earnings forecasts. Failing to meet the market's expectations for earnings can cause significant penalties for a company (Robb, 1998). Penalties are commonly large drops in stock prices. Since frequent earnings surprises also affect investor confidence, the company's cost of financing will increase. Therefore, managers have the incentive to minimize analysts' forecast errors, that is, the differences between reported earnings and earnings forecasts. When managers believe earnings are falling below expectations, they may try to meet earnings forecasts through earnings management. Further, when information asymmetry between managers and stakeholders exists, managers are able to manage earnings to reach corporate earnings targets and market expectations. A high quality audit limits management's ability to manage earnings because it is more likely that the auditor would detect earnings management and information asymmetry would be reduced. Hence, holding other factors constant, analysts' forecast errors would be large when audit quality is high, and vice versa.

While some studies have examined the association between audit quality and management earnings forecasts (e.g., Davidson and Neu, 1993; Clarkson, 2000), no research has investigated the relationship between audit quality and analysts' forecast errors. This study investigates whether actual audit quality is related to analysts' forecast errors.

1.5 Research Questions

The research questions addressed in this study are:

1. Does the perceived audit quality proxy capture actual audit quality?
2. How is actual audit quality related to earnings management?
3. How is actual audit quality related to financial analysts' forecast errors?

1.6 Overview of the Study

This study contains three main parts. The first part tests whether the market perceived audit quality also captures actual audit quality using apparent audit failures reflected in AAERs, restatements, and litigation against auditors. The second part investigates the relationship between actual audit quality and earnings management measured by discretionary accruals. The third part examines the relationship between actual audit quality and analysts' earnings forecast errors. All the analyses will be done through comparisons between a group of companies experiencing apparent audit failures and a matched control group with similar characteristics.

1.7 Contribution of the Study

This study has implications for both audit quality research and accounting information users. First, this study distinguishes the concepts of perceived audit quality and actual audit quality and tests whether market-perceived audit quality captures actual audit quality. Accordingly, audit quality research which has not clearly determined whether size is a suitable proxy for actual and perceived audit quality, may be informed by the results of this study. Second, this study tests how actual audit quality is associated with earnings management and analysts' forecast errors. The empirical results of this study have implications for both researchers and accounting information users in that assessment of actual audit quality through observing evidence of earnings management and sensitivity to analysts' forecast errors may be clarified.

1.8 Organization of the Study

The reminder of this study is organized as follows: Chapter 2 reviews the relevant research and presents the theoretical foundation for the testable hypotheses. Chapter 3 contains the methodology for this study, including a description of the sample selection and models to be tested. Chapter 4 presents sample characteristics, descriptive statistics and testing results. Chapter 5 provides conclusions of the study.

CHAPTER 2: LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESES

2. 1 Introduction

The focus of this study is to test whether the market-perceived audit quality captures actual audit quality. It also investigates the relationships among actual audit quality measured by a post hoc identification of auditor failures and earnings management as well as financial analysts' forecast errors. Prior literature in audit quality, earnings management and financial analysts' forecast errors are reviewed in this chapter. Hypotheses are developed based on prior literature.

2.2 Review of Audit Quality and Actual Audit Quality

Audit quality has been a topic of significant interest in accounting research. In order to improve the understanding of audit quality, numerous studies have tried to detect the association between audit quality and other variables. However, since audit quality is difficult to observe, studies have operationalized it in different ways. This section reviews the literature defining audit quality and describing audit quality proxies.

2.2.1 Definition of Audit Quality

One common definition of audit quality is provided by DeAngelo (1981). She defines audit quality as "the market-assessed joint probability that a given auditor will both (a) discover a breach in the client's accounting system, and (b) report the breach." The probability that the auditor will report the detected misstatements is defined by DeAngelo (1981) as auditor independence. Therefore, according to DeAnglo's (1981) definition, audit quality is an increasing function of an auditor's ability to detect accounting misstatements and auditor independence as assessed by the market. DeAngelo's (1981) definition refers to "market-assessed" or perceived audit quality. When applying this definition to actual audit quality, there is an underlying assumption that market perceived audit quality reflects actual audit quality. However, many studies (e.g., Krishnan, 2003; Krishnan and Schauer, 2000; Deis and Giroux, 1992) adopt this definition without addressing the distinction between these two different concepts.

Palmrose (1988) defines audit quality in terms of level of assurance. Since the purpose of an audit is to provide assurance on financial statements, audit quality is the probability that financial statements contain no material misstatements. In fact, this definition uses the results of the audit, that is, reliability of audited financial statements to reflect audit quality. This definition leads to the following question: "How do financial statement users assess the level of assurance and reliability of audited financial statements?" This is a post hoc audit quality definition because the assurance level cannot be assessed until the audit has been conducted. As a result, Palmrose's definition refers to actual audit quality.

Other researchers also have suggested definitions for audit quality. For example, Titman and Trueman (1986) define auditor quality[3] in terms of the accuracy of information the auditor supplies to investors. Their definition is similar to the one provided by Palmrose (1988). Davidson and Neu (1993) provide an audit quality

[3] Titman and Trueman (1986) provide a definition of auditor quality rather than audit quality. Although audit quality and auditor quality might be different concepts, prior studies have not clearly distinguished these two terms.

definition that is based on the auditor's ability to detect and eliminate material misstatements and manipulations in reported net income. Lam and Chang (1994) suggest that audit quality should be defined on a engagement-by-engagement[4] rather than on a firm basis.

An important issue regarding the definition of audit quality is whether to distinguish auditor quality from audit quality. Many studies do not make this distinction and even use the concepts interchangeably (e.g., Clarkson, 1998; Colbert and Murray, 1998). Under certain conditions, auditor quality and audit quality might be used interchangeably. For instance, according to assumptions underlying DeAngelo's (1981) audit quality definition, when an auditor provides only one level of quality of audit service, auditor quality and audit quality can be used interchangeably. However, as stated earlier, this assumption may be problematic. Anecdotal evidence suggests that all of the largest audit firms have been associated with audit failures. Therefore, auditor quality should be defined as the overall audit service quality of a certain audit firm. Meanwhile, as Lam and Chang (1994) have pointed out, audit quality should be defined on a service-by-service basis because an audit firm may not conduct all its audits with the same level of quality. In other words, auditor quality is a firm-based concept and audit quality is a service-by-service based concept. Therefore, it is important to distinguish these two concepts based on the purposes of different studies. The current study focuses on the concept of audit quality rather than auditor quality.

[4] If audit quality is defined on a engagement-by-engagement, audit quality will reflect the service performance of a particular audit.

Perceived audit quality and actual audit quality appear to be different concepts. Although it is more important to investigate actual audit quality issues because the goal is to better understand actual audit quality, it is usually difficult to measure it directly. Actual audit quality is unobservable and can be evaluated only after audits have been conducted. For example, Palmrose (1988) measures actual audit quality using auditors' litigation activities. Deis and Giroux (1992) analyze quality control reviews to get a measure of actual audit quality in the public sector. Krishnan and Schauer's (2000) measure of actual audit quality is based on how audited financial statements comply with eight specific GAAP reporting requirements. Deis and Giroux (1992) and Krishnan and Sauer (2000) both measure actual audit quality in the not-for-profit sector. These two studies benefit from the availability of quality measures because of their context, but might suffer from generalization problems.[5]

Many studies test perceived audit quality due to the difficulty of measuring actual quality directly. DeAngelo (1981) analytically demonstrates that the larger the auditor, the less incentive the auditor has to behave opportunistically and the higher the perceived quality of the audit. Teoh and Wong (1993) test whether perceived audit quality is different between Big 8 and non-Big 8 accounting firms. Moreland (1995) investigates how SEC enforcement actions against Big 8/6 accounting firms affect their market perceived audit quality. Hogan (1997) documents that the perception of higher audit quality is associated with less underpricing in the IPO market. Balsam *et al.* (2000) examine whether industry specialization increases market perceived audit quality.

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[5] These two studies (Deis and Giroux, 1992, and Krishnan and Sauer, 2000) use available actual audit quality measures in the not-for-profit sector. However, results of studies in the not-for-profit sector might not be able generalizable to a for-profit setting.

Although it is difficult to measure actual audit quality, market perceptions of audit quality are more amenable to measurement. The market response to audited accounting information can be observed. If the market were completely efficient, market perceived audit quality would always capture actual audit quality. Researchers may benefit from better understanding the relationship between perceived audit quality and other variables because the results of perceived audit quality studies may be applied to research questions regarding actual audit quality issues. However, if the market fails to assess actual audit quality in some circumstances, perceived audit quality will not capture actual audit quality in those situations. Therefore, it may be interesting to test whether perceived audit quality captures actual audit quality.

2.2.2 Audit Quality Measures and the Size Proxy

Despite actual audit quality not being observable before post hoc evaluations of audit is performance are available, many researchers have tried different ways to measure it either directly or indirectly. DeAngelo (1981) analytically demonstrates that auditor size is positively related to audit quality. In her study, auditor size is measured by number of clients. She argues that since auditors earn client-specific quasi-rents, auditors with more clients have more to lose by failing to report discovered misstatements in financial statements. Based on DeAngelo's (1981) analytical results, many studies use auditor size, specifically Big 8/6/5 vs. non-Big 8/6/5, to differentiate audit quality levels (e.g., Krishnan, 2003; Zhou and Elder, 2001; Bauwhede *et al.*, 2000; Becker *et al.*, 1998; Clarkson and Simunic, 1994;

Copley, 1991). While auditor size (Big 8/6/5 vs. non-Big 8/6/5) is the most commonly used audit quality measure, other measures also have been used.

Some studies have used audit fees as quality measures. Palmrose (1986) finds that there is a significant association between audit fees and auditor size measured by a Big 8 vs. non-Big 8 dichotomy. If the size proxy, that is, Big 8 vs. non-Big 8, is a measure for perceived audit quality, audit fees could be another perceived audit quality measure. Copley (1991) finds that using audit fees as the audit quality measure has greater power than a Big 8 vs. non-Big 8 dichotomy in explaining variation levels of local government disclosure.

A wide variety of prior research projects have proposed alternatives for measuring audit quality. Teoh and Wong (1993) indirectly measure audit quality using earnings response coefficients. Chow and Wong-Boren (1986) use loan officers' perception to indicate audit quality. Shauer (2001) measures audit quality using client bid-ask spread, which is the difference between the ask price and bid price for a client company's stock. Colbert and Murray (1998) measure audit quality using the results of peer review.

Other studies use more direct measures of audit quality. For example, Deis and Giroux (1992) analyze quality control reviews of actual audit engagements and use the results to differentiate audit quality levels in the public sector. The audit quality measure in Krishnan and Schauer's (2000) study is based on entities' compliance with GAAP reporting requirements, assuming that extent of compliance with GAAP is likely to be directly related to the probability of detecting and reporting material misstatements.

Assuming that managers have incentives to meet their own earnings forecasts, Davidson and Neu (1993) measure audit quality using management forecast errors in a Canadian setting. Management forecast errors are the absolute values of differences between reported earnings and management forecast earnings, where higher forecast errors indicate higher audit quality and lower forecast errors indicate lower audit quality. In their study, they assume that management earnings forecasts are independent from audit quality because management earnings forecasts were not audited but only reviewed by auditors in Canada during the period[6] of the study. Therefore, the higher the audit quality, the lower the ability of management to meet its earnings forecasts through earnings management and the larger the earnings forecast errors. In Lam and Chang's (1994) study, audit quality also is measured by earnings forecasts errors in prospectuses of initial public offerings (IPOs) in Singapore. However, different from Davidson and Neu's (1993) measurement approach, they argue that higher forecast errors should reflect a lower audit quality level because, in Singapore, earnings forecasts are verified and certified by company auditors. In this case, management's earnings forecasts are not independent from audit quality. On the contrary, these forecasts are affected by audit quality. Therefore, in this context, higher audit quality should be associated with smaller errors in management's earnings forecasts.

Many studies document that Big 8/6/5 auditors provide higher audit quality than non-Big 8/6/5 auditors (e.g., Davidson and Neu, 1993; Teoh and Wong, 1993).

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[6] The testing period of Davidson and Neu's (1993) study is 1983-1987. During that period, independent auditors only reviewed management's forecast assumptions for reasonableness. As noted in McConomy (1997), there was a shift from review- to audit-level assurance for management earnings forecasts in July 1989 in Canada.

However, there are also studies indicating that Big 8/6/5 auditors might not always provide higher quality audit service than do non-Big 8/6/5 auditors. Kim *et al.* (2002) investigate how differentiation of audit effectiveness between Big 6 and non-Big 6 auditors is affected by a conflict or convergence of reporting incentives of corporate managers and external auditors. When managers have incentives to overstate reported earnings through income-increasing accrual choices, auditor conservatism creates a conflict between managers and auditors. When managers have incentives to understate reported earnings through income-decreasing accrual choices, auditor conservatism creates a convergence between managers and auditors. The authors use current relative performance to determine managers' incentives. Current relative performance is measured by the difference between operating cash flows in the current year divided by lagged total assets and the median cash flow performance in each industry to which a company belongs. They find that Big 6 auditors are more (less) effective in preventing earnings management than non-Big 6 auditors in the presence (absence) of reporting incentive conflicts between managers and auditors.

Lam and Chang (1994) investigate the relationship between audit quality and auditor size using the mean error in earnings forecasts as an audit quality measure in prospectuses of IPOs in Singapore. They find that, on average, use of a Big 6 auditor does not result in smaller prediction errors in earnings forecasts than does use of a non-Big 6 audit firm. Petroni and Beasley (1996) find no systematic difference in claim loss reserve accuracy or bias between clients of Big 8 auditors and clients of other auditors. Tate (2001) examines the results of financial statement and compliance audits performed in accordance with the U.S. Office of Management and Budget's A-133 requirements.[7] She finds that, although Big 6 auditors report more questioned costs and more findings than non-Big 6 auditors, Big 6 auditors are less likely to issue qualified opinions given their clients' deficiencies in internal control than non-Big 6 auditors.

Although many studies support the argument that Big 8/6/5 auditors provide higher-quality audit service than non-Big 8/6/5 auditors, other studies have found conflicting results. Size might not be an effective proxy for audit quality in certain circumstances. Perhaps, as Lam and Chang (1994) suggest, audit quality might be assessed more effectively on a service-by-service basis. This study offers an opportunity to investigate directly whether the market appropriately assesses actual audit quality, in other words, whether market perceived audit quality reflects actual audit quality.

2.3 Audit Quality and Earnings Management

If managers and shareholders are both utility maximizers, managers may not act in the best interests of shareholders (Jensen and Meckling, 1976). Specifically, if the compensation of managers is associated with companies' performance, managers have incentives to misreport earnings. "The demand for auditing services arises from a need to facilitate dealings between the parties involved in business

[7] Using a database of almost 77,000 compliance and financial statement audit results for non-profit organizations, Tate (2001) finds Big 5 auditors report more noncompliance with federal regulations in the form of findings and questioned costs than non-Big 5 auditors. However, after controlling for the number and extent of errors identified by the auditor, she finds size auditors are less likely than non-size auditors to qualify their report on an organization's compliance with federal regulations. She also finds that size auditors are less likely than non-Big 5 auditors to report significant deficiencies in internal control.

relationships—shareholders, creditors, public authorities, employees and customers, etc. Exchanges between such parties are usually costly since informational asymmetries give rise to uncertainty concerning the performance of the contractual obligations" (Arrunada, 2000). The function of auditing is to mitigate information asymmetries among related parties. High audit quality should be related to low levels of information asymmetry and low levels of "uncertainty concerning performance." Therefore, audit quality should be negatively related to earnings management.

Several studies have tested how auditing affects earnings management. For example, Becker *et al*. (1998) examine the effect of audit quality on earnings management through discretionary accruals and find that discretionary accruals of clients of Big 6 auditors are lower than discretionary accruals of clients of non-Big 6 auditors. However, they did not test for income-decreasing discretionary accruals but only income-increasing earnings management. Bauwhede *et al.* (2000) document that audit quality and public ownership act as constraints on income-decreasing earnings management but not on income-increasing earnings management in Belgium.

2.3.1 Earnings Management Research

In order to test the relationship between audit quality and earnings management, it is necessary to describe earnings management in greater detail. In the following sections, I will review some related earnings management studies that define earnings management and provide earnings management models.

2.3.1.1 Definition of Earnings Management

Earnings management has been defined in different ways. Schipper (1989) defines earnings management as "a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain (as opposed to, say, merely facilitating the neutral operation of the process)…." Healy and Wahlen (1999) propose that "earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers." Although earnings management might be defined differently, there seems to be the same underlying concept that earnings management distorts a company's real performance. Considering these two definitions, earnings management in this study is defined as purposeful activities that managers conduct to mislead some information users in order to obtain some private gain.

Healy and Wahlen (1999) summarize the incentives of managers to engage in earnings management. Managers have incentives to manage earnings when contracts between a company and other parties are based on accounting results. Some contractual incentives include maximizing management compensation, complying with debt covenants, ensuring job security, and facilitating union negotiations. Managers also manage earnings to impact the market. For example, earnings can be managed in periods surrounding IPOs (Teoh *et al.*, 1998a) and seasoned equity offerings (Teoh *et al.*, 1998b; Rangan, 1998) to increase offering prices of the stock. Also, managers have incentives to meet earnings forecasts because the market appears to penalize companies that miss analysts' earnings forecasts (Robb, 1998).

2.3.1.2 Estimation of Earnings Management

Dechow *et al.* (1995) state, "Analysis of earnings management often focuses on management's use of discretionary accruals." There are several accrual-based models for detecting earnings management. For example, Healy (1985) estimates discretionary accruals using a two-step process. First, he estimates nondiscretionary accruals by scaling the mean of total accruals by lagged total assets from the estimation period. Second, discretionary accruals are measured by the difference between event year total accruals scaled by lagged total assets and estimated nondiscretionary accruals.

Some models decompose total accruals into nondiscretionary accruals and discretionary accruals. These models first estimate nondiscretionary accruals, then subtract these estimated nondiscretionary accruals from event year total accruals to yield discretionary accruals (DeAngelo, 1986; Jones, 1991; Dechow *et al.*, 1995). For example, DeAngelo (1986) models nondiscretionary accruals as the prior period's total accruals scaled by lagged total assets. When estimating nondiscretionary accruals, Jones (1991) considers the changes in a company's economic circumstances, such as changes in revenues and changes in fixed assets. Dechow *et al.* (1995) modify the Jones Model (Modified Jones Model) to control for a change in receivables when estimating nondiscretionary accruals. Dechow *et* *al.* (1995) also use an Industry Model in which nondiscretionary accruals are measured using the median of total accruals scaled by lagged total assets in the same industry. DeFond and Jiambalvo (1994b) use a cross-sectional version of the Jones Model (Cross-Sectional Modified Jones Model) that estimates the parameters of the models using cross-sectional data rather than time-series data.

Dechow *et al.* (1995) evaluate the performance of several models in detecting earnings management by comparing the specification and power of commonly used test statistics across the measures of discretionary accruals generated by those models. They conclude that the Modified Jones Model provides the most powerful tests of earnings management. Bartov, Gul, and Tsui (2002) further provide evidence that the Cross-Sectional Jones Model and the Cross-Sectional Modified Jones Model both perform better than their time-series counterparts. In investigating the relationship between earnings management and audit quality issues, many current studies use the Cross-Sectional Jones or Modified Jones Model (e.g., Becker *et al.*, 1998; Davis *et al.*, 2000; Krishnan, 2003). The current study uses the Cross-Sectional Modified Jones Model to estimate earnings management.

2.4 Audit Quality and Analysts' Earnings Forecast Errors

Prior research has tested the relationship between audit quality and management earnings forecast errors in different settings. Assuming that managers have incentives to minimize the difference between management forecasted earnings and reported earnings, Davidson and Neu (1993) argue that higher auditor quality should be associated with larger management earnings forecast errors. Specifically, they find that Big 8 accounting firms are associated with larger management earnings forecast errors. Clarkson (2000) extends Davidson and Neu's (1993) study for two distinct time periods in Canada. During the first period, 1984-1987, Canadian auditors had a responsibility to review management's earnings forecasts. During the second period, 1992-1995, Canadian auditors audited management's earnings forecasts. Using data from the audit assurance period, Clarkson (2000) documents that Big 6 auditors are associated with smaller, not larger, absolute earnings forecast errors. The contrast between these two testing periods suggests that whether management's earnings forecasts are independent from audit quality has an impact on the ability to use management's earnings forecast errors to measure audit quality. Other studies have investigated the association between audit quality and management forecast errors in an IPO setting. Firth and Smith (1992a, 1992b) fail to detect a significant relationship between auditor size (Big 8 vs. non-Big 8) and the accuracy of earnings forecasts in IPO prospectuses.

The relationship between audit quality and analysts' forecast errors may provide more insights into audit quality for the U.S. setting because while managers have the incentive to "meet or beat" these earnings forecast targets, auditor assurance does not influence the forecasting process of external analysts. Prior research has documented managers' incentives to meet analysts' earnings forecasts. In an analysis of AAERs covering the period from 1997 to 1999, the Public Oversight Board (2000) reports that one of the motivations for companies to misstate their financial statements is "meeting financial analysts' earnings forecasts"(p. 228).

Recent studies provide the reasons for such incentives. Kasznik and McNichols (2002) investigate whether the market rewards companies meeting current period earnings expectations and find that abnormal annual returns are significantly greater for companies meeting analysts' earnings forecasts. Bartov, Govly, and Hayn (2002) find that companies that meet current analysts' expectations enjoy a higher return over the quarter than firms that fail to meet these expectations. They suggest that meeting analysts' earnings forecasts is likely to have been achieved by earnings or expectations management. However, there has not been extensive investigation of the relationship between audit quality and analysts' forecast errors. Davis *et al.* (2000) find that the absolute value of analysts' forecast errors declines with increases in auditor tenure and that a client's ability to exceed analysts' forecasts improves with increased auditor tenure. This suggests that managers are able to meet analysts' earnings forecasts more easily as auditor tenure increases. If auditor tenure is related to auditor independence, audit quality also may be associated with financial analysts' forecast errors since auditor independence is a component of audit quality.

2.5 Development of Hypotheses

2.5.1 Introduction

Prior research has shown that audit quality is positively associated with audit firm size (e.g., Krishnan and Schauer, 2000; Lennox, 1999; Colbert and Murray, 1998; Deis and Giroux, 1992; Palmrose, 1988; DeAngelo, 1981). However, there is other evidence showing that size may not always be positively related to audit quality and that the largest accounting firms may not always provide higher quality audits than do small accounting firms (e.g., Tate, 2001; Lam and Chang, 1994). The results of these studies indicate that size may reflect only users' perceived audit quality.

This study has an opportunity to contribute to existing research by investigating the association among actual audit quality and other variables such as earnings management and analysts' forecast errors to provide evidence about relationships among them using a post hoc actual audit quality assessment. This study examines whether the perceived audit quality proxy used in prior research (i.e., size) also captures actual audit quality. This study also examines the association among actual audit quality, earnings management and analyst earnings forecast errors using a post hoc audit quality evaluation. Hypotheses are developed in the following sections.

2.5.2 Perceived Audit Quality and Actual Audit Quality

Investigating whether size is a valid proxy for actual audit quality might provide insights for audit quality research, specifically, evidence of how well the market assesses audit quality. DeAngelo's (1981) argument for a positive relationship between auditor size and audit quality assumes market transparency. However, it is unclear whether financial statement users assess audit quality accurately. It is possible that the size effect is so significant that the market assesses audit quality mainly on the basis of auditor reputation rather than on the auditor's ability to detect and report material misstatements of financial statements for specific audits.

Apparent audit failures provide a way of testing the accuracy of the market assessment of actual audit quality because they provide less ambiguous, post hoc quality determinations. In order to provide insights into audit quality, this study examines whether the value-relevance of accounting information is different for companies experiencing apparent audit failures than for companies not experiencing apparent audit failures. Value-relevance indicates the extent to which accounting information explains the variation of market prices. If financial statement users assess actual audit quality accurately, the association between stock price and accounting information should be weak when actual audit quality is poor because accounting information should be viewed as less reliable for stock investment decision making. Following prior studies (Amir, 1996; Amir and Lev, 1996; Collins *et al.*, 1997; Rees, 1999; Rajgopal *et al.*, 2002), the Ohlson Model (Ohlson, 1995) is used to test the value-relevance of accounting information. The Ohlson Model relates a company's market value to its contemporaneous accounting information. Specifically, this model provides a structure for empirical study of the relationship between equity values and both earnings and book values (Stober, 1999).

The value-relevance level is measured by the R^2 of the Ohlson Model (Collins *et al.*, 1997; Rees, 1999; Rajgopal, 2002). R^2 is a measure for the association between a dependent variable and independent variables in a regression model. It measures how much of the variation in the dependent variable is explained by independent variables. When financial statement users perceive higher audit quality and therefore more reliable financial statements, accounting information such as earnings and book values should explain more of the variation in stock prices. Additionally, the power of accounting information in explaining the changes in prices should be greater. If financial statement users assess audit quality accurately, the power of accounting information in explaining stock price changes should be low (high) when actual audit quality is low (high). However, if users cannot assess audit quality accurately, the above relationship might not hold. This discussion leads to the first hypothesis, stated as follows:

> **H1**: *The explanatory power of earnings and book values for stock prices of companies experiencing apparent audit failures will be lower than the explanatory power for a matched group of companies that have not experienced apparent audit failures.*

2.5.3 Audit Quality and Earnings Management

Prior research has not investigated the relationship among actual audit quality and other variables such as earnings management and analysts' earnings forecast errors using a post hoc audit quality assessment. Many of the prior studies that test the relationship between audit quality and earnings management use the size proxy for audit quality (Bauwhede *et al.*, 2000; Davis *et al.*, 2000; Becker et al, 1998). As stated in the prior section, financial statement users may not assess audit quality accurately, and size might not be able to capture actual audit quality. Furthermore, the size proxy cannot reflect differences among auditors within the Big 8/6/5 or capture variations across different periods. The post hoc identification of apparent audit failures helps to test the relationship between actual audit quality and earnings management.

Management compensation often is based on reported earnings. Managers have incentives to manage earnings to maximize their wealth. Management's ability to manage earnings increases as the information asymmetry between management and stakeholders increases (Zhou and Elder, 2001). Therefore, higher-quality audits should be associated with less information asymmetry and should be more likely to successfully prevent and detect earnings management. Following Becker *et al.* (1998), the level of earnings management thus should be associated with audit quality. The current study is different from Becker *et al.*'s (1998) study in that size proxy is not used as the quality proxy. Instead, audit quality is determined by post hoc identification of apparent audit failures. This leads to the following hypothesis:

> **H2**: *Companies experiencing apparent audit failures will exhibit higher levels of earnings management measured by discretionary accruals than similar companies that have not experienced apparent audit failures.*

2.5.4 Audit Quality and Analysts' Earnings Forecast Errors

As suggested by prior research (e.g., Robb, 1998; POB, 2000), managers have incentives to meet analysts' earnings forecasts. Assuming that managers have incentives to minimize the difference between analysts' forecasted and reported earnings, lower-quality audits will tend to be associated with smaller analysts' forecast errors. Moreover, prior research has suggested that a high-quality audit may effectively prevent the company's ability to manage earnings with respect to analysts' forecasts (Davis *et al.*, 2000). Using a post hoc identification of apparent audit failures provides an opportunity to investigate the relationship between actual audit quality and analysts' forecast errors. This leads to the following hypothesis:

> **H3*:*** *Companies experiencing apparent audit failures will exhibit lower levels of analysts' forecast errors than similar companies that have not experienced apparent audit failures.*

2.6 Conclusion

The purpose of this chapter was to review prior literature in audit quality, earnings management, and analysts' forecast errors, and to propose testable hypotheses based on theoretical frameworks of prior research. The next chapter will describe sample selection and models used to test the proposed hypotheses.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter presents sample selection procedures, models used to test hypotheses, and data analyses.

3.2 Sample Selection

This section identifies the data sources from which data are collected.

3.2.1 Cases of Apparent Audit Failures

Companies included in this study are selected from three major sources: the SEC's AAERs, restatements of financial statements in the Wall Street Journal Index and Lexis-Nexis news library, and news accounts of litigation alleging audit failures for the period 1990-2000. The initial sample is the combination of these three data sources. As stated by Palmrose (1988), auditors' failure to detect material misstatements of financial statements results in "audit failures." These three sources help identify apparent audit failures as defined in Chapter 1 of this study. AAERs indicate that the SEC has determined that companies that had misstatements in their financial reports. Another source is a search of news in the Wall Street Journal Index using "restatement" as the keyword. Additionally, the Wall Street Journal Index serves as the source of the litigation news accounts to be reviewed. Lawsuits seeking damages from auditors are not always indicative of auditors' failure to adhere to professional standards. However, a careful review of such cases helped to ensure that only apparent audit failures found in the sources noted above are captured in the sample.

3.2.2 Accounting, Prices, and Earnings Forecast Data

In order to perform hypothesis testing, all accounting data necessary for testing the proposed relationships for companies selected from AAERs, the Wall Street Journal Index, and litigation databases is extracted from the COMPUSTAT database. Price information is selected from CRSP. Analysts' most recent consensus earnings forecasts are found in the Zack's database.

3.2.3 Matching of Companies to a Control Group

A matched control group is selected based on established matching criteria. Matching is based on several criteria, including the year of financial statements, auditor size (Big 8/6/5 vs. non-Big 8/6/5), client industry, and client size. The matching procedure for different situations is discussed in detail later in this chapter. The required accounting data, prices, and analysts' earnings forecast information is compiled for the matched control group from COMPUSTAT, CRSP, and Zack's databases, respectively.

3.3 Models and Approach to Testing

This section presents the models and methods used to test the hypotheses.

3.3.1 Hypothesis 1

In order to test whether perceived audit quality captures actual audit quality, this study investigates whether actual audit quality is assessed accurately. Because auditing is a monitoring device that adds assurance to financial statements, ceteris paribus, financial statement users should view financial statements associated with high-quality audits as more reliable than financial statements associated with low-quality audits. In other words, value-relevance levels of accounting data associated with high-quality audits and low-quality audits should be different. If an audit is perceived to be of higher quality, the financial statements associated with that audit should be perceived to be more reliable. Investors will rely more heavily on accounting data when perceived audit quality is higher. Therefore, value-relevance of accounting data should reflect perceived audit quality.

3.3.1.1 Model Specification

The model used to test the first hypothesis is Ohlson's (1995) valuation model. Ohlson (1995) analytically demonstrates that a company's market value can be expressed by its contemporaneous abnormal earnings and book value. Following Amir (1996), Amir and Lev (1996), and Collins *et al.* (1997), the current study applies the Ohlson Model expressed as follows:

$$P_{it} = \alpha_1 EPS_{it} + \alpha_2 BVPS_{it} + \varepsilon_{it} \qquad \text{(Equation 3.1)}$$

where:

P_{it} = stock price of the company i's equity at time t;

EPS_{it} = company i's reported earnings per share before extraordinary items for period t;

$BVPS_{it}$ = company i's book value of equity per share at time t;

ε_{it} = random error term with mean 0 and variance 1;

α_1 and α_2 = the regression coefficients.

3.3.1.2 Testing of Hypothesis 1

To test whether financial statement users systematically fail to assess actual audit quality, the explanatory power of the Ohlson Model is evaluated by testing the difference in the R^2s between a group of companies experiencing apparent audit failures, and a matched control group of companies that have not experienced apparent audit failures. For each comparison, two OLS regressions of the Ohlson Model are performed, one for the audit failure group, and the other for the matched control group. As stated earlier, value-relevance of accounting information may indicate perceived audit quality. If perceived audit quality is high, accounting information should explain more variation in companies' stock price. If perceived audit quality is low, accounting information should explain less variation in stock price. Further, the association between stock price and accounting data will be weak. If the market evaluates audit quality appropriately, the explanatory power (R^2) of the Ohlson model for the audit failure group should be lower than the explanatory power for the control group.

In order to test H1, a comparison is made between an apparent audit failure group of companies and a matched control group of companies that have not experienced apparent audit failure. If the R^2 for the audit failure group is lower than the R^2 for the matched control group, it suggests that the market assesses actual audit quality accurately. If the R^2 for the audit failure group is equal to or higher than the R^2 for the matched control group, it suggests that the market may not assess actual audit quality accurately. Moreover, financial statement users' ability to assess actual audit quality might be different in different situations. For example, the ability to assess actual audit quality might depend on whether the auditor is a Big 8/6/5 auditor or non-Big 8/6/5 auditor. Comparisons to test H1 are summarized in the following table:

Comparison	Failure Group (AF) Auditor	Non-Failure Group (NAF) Auditor	Results and Implications	
			If $R^2_{AF} < R^2_{NAF}$	If $R^2_{AF} >= R^2_{NAF}$
1	Both Big 8/6/5 and non-Big 8/6/5 auditor	Both Big 8/6/5 and non-Big 8/6/5 auditor	The market assesses actual audit quality accurately	The market may not assess actual audit quality accurately
2	Big 8/6/5 auditor	Big 8/6/5 auditor	The market assesses actual audit quality accurately for Big 8/6/5 auditors	The market may not assess actual audit quality accurately for Big 8/6/5 auditors
3	Non-Big 8/6/5 auditor	Non-Big 8/6/5 auditor	The market assesses actual audit quality accurately for non-Big 8/6/5 auditors	The market may not assess actual audit quality accurately for non-Big 8/6/5 auditors
4	Big 8/6/5 auditor	Non-Big 8/6/5 auditor	The market assesses actual audit quality accurately regardless of auditor size	Market assessment may be dysfunctionally influenced by auditor size
5	Non-Big 8/6/5 auditor	Big 8/6/5 auditor	The market assesses actual audit quality accurately regardless of auditor size	Market assessment may be dysfunctionally influenced by auditor size

3.3.2 Hypothesis 2

3.3.2.1 Estimation of Earnings Management

Prior research suggests that earnings management can be measured by discretionary accruals (e.g., Dechow *et al.*, 1995). Because an important function of auditing is to decrease information asymmetry between management and stakeholders, auditors that provide higher-quality service should be more likely to detect earnings manipulation by management. Therefore, it is hypothesized that discretionary accruals should be negatively related to audit quality. Consistent with Becker *et al.* (1998), this study measures discretionary accruals using the Cross-Sectional Modified Jones Model. Discretionary accruals are estimated from the following model:

$$TAC_{ijt} = \alpha_{1jt}\left(\frac{1}{TA_{ijt-1}}\right) + \alpha_{2jt}\left(\Delta REV - \Delta REC\right) + \alpha_{3jt} PPE_{ijt} + \varepsilon_{ijt}$$

(Equation 3.2)

Where:

TAC_{ijt} = total accruals for sample company i in industry j at period t scaled by lagged assets;

TA_{ijt-1} = lagged assets, total assets for sample company i in industry j at period $t-1$;

ΔREV_{ijt} = change in net revenues for sample company i in industry j at period t;

ΔREC_{ijt} = change in net receivables for sample company i in industry j at period t;

PPE_{ijt} = gross property plant and equipment for sample company i in industry j at period t;

α_{1jt} , α_{2jt} , α_{3jt} = coefficients of the regression model;

ε_{ijt} = random error term

Consistent with prior research (e.g., Becker *et al.*, 1998), total accruals are defined as income before extraordinary items minus operating cash flows. OLS regression is used to obtain industry-specific estimates for α_{1jt} , α_{2jt} , and α_{3jt} for the model. The residuals (the difference between fitted values and actual total accruals) are the discretionary accruals:

$$DAC_{it} = | TAC_{it} - T\hat{A}C_{ijt} |$$

3.3.2.2 Model Specification

After discretionary accruals have been estimated using the Cross-Sectional Modified Jones Model, the following model is used to test H2:

$$DA_{it} = \lambda_0 + \lambda_1 AF_{it} + \lambda_2 MTB_{it} + \lambda_3 LEV_{it} + \lambda_4 LGTA_{it} + \\ + \lambda_5 OCF_{it} + \lambda_6 ABTAC_{it} + \varepsilon_{it}$$

(Equation 3.3)

where,

DA_{it} = absolute value of discretionary accruals based on the Modified Jones Model;

AF_{it} = audit failure taking value 1 if company i is from the audit failure group, 0 otherwise;

MTB_{it} = the ratio of market to book value of equity;

LEV_{it} = leverage, defined as total debts over total assets;

LTA_{it} = natural logarithm of total assets;

$ABTAC_{it}$ = absolute value of total accruals;

OCF_{it} = operating cash flows;

λ_0 = the intercept of the regression model;

$\lambda_1, \lambda_2, .. \lambda_6$ = coefficients of the regression model;

ε_{it} = random error term with mean 0 and variance 1.

Additional factors that might have an effect on earnings management are included in the model as control variables. As stated earlier, a company's market-to-book value is a proxy for growth opportunities and may affect earnings management, as suggested by Zhou and Elder (2001). Prior research suggests that leverage might be associated with earnings management (Becker *et al.*, 1998; DeFond and Jiambalvo, 1994). Company size is included to control for the size effect. Becker *et al.* (1998) argue that a client's accrual-generating potential and operating cash flows also might affect earnings management. The absolute value of total accruals is added as a proxy for a company's accrual-generating potential.

3.3.2.3 Testing of Hypothesis 2

To test H2, first the mean discretionary accruals between the audit failure and non-audit failure groups are compared using a t-test and a non-parametric Wilcoxon test. Significantly higher mean discretionary accruals of the audit failure group compared with those of the matched control group suggests that poor actual audit quality is associated with higher levels of earnings management. Next, the OLS regression model specified previously, which includes the primary independent variable *AF* and the other control variables to check other possible affecting factors, is performed. The OLS estimation of coefficient λ_1 is of primary interest. A positive and significant λ_1 supports the alternative hypothesis that poor audit quality is associated with high levels of earnings management measured by discretionary accruals and controlling for other influential factors.

3.3.3 Hypothesis 3

Management has the incentive to meet analysts' earnings forecasts because failure to meet earnings forecasts provides a negative signal to the market. As stated in the previous section, auditors should prevent all material misstatements of financial statements, including earnings management. Management has an incentive to manipulate earnings if actual earnings do not meet earnings forecasts. If an auditor performs high-quality audits, the clients' ability to engage in earnings management will be limited. More specifically, clients would have more difficulty meeting analysts' earnings forecasts when audit quality is high. Therefore, the absolute value of the difference between reported earnings and analysts' earnings forecasts (earnings forecast errors) should be negatively related to audit quality.

3.3.3.1 Model Specification

Consistent with Davis *et al.* (2000), an OLS regression model is used to test H3. The OLS regression model is expressed as follows:

$$FE_{it} = \theta_0 + \theta_1 AF_{it} + \theta_2 LGTA_{it} + \theta_3 LAG_{it} + \theta_4 N_{it} + \theta_5 STD_{it} + \varepsilon_{it}$$

(Equation 3.4)

where:

FE_{it} = analysts' earnings forecast error, measured as the absolute value of the difference between actual reported earnings and analysts' consensus forecast earnings;

AF_{it} = dummy variable of audit failure taking value 1 if company i is from the audit failure group, 0 otherwise;

$LGTA_{it}$ = natural logarithm of total assets;

LAG_{it} = number of days between most recent earnings forecasts and fiscal year end;

N_{it} = number of analysts' forecasts included in consensus forecasts

STD_{it} = variation of analysts' forecasts, measured as standard deviation of earnings forecasts made for company *i*;

θ_0 = the intercept of the regression model;

$\theta_1, \theta_2, ... \theta_5$ = the coefficients of the regression model;

ε_{it} = random error term with mean 0 and variation 1.

To control for the size effect on analysts' forecast errors, the natural logarithm of total assets is included as an independent variable. Prior research suggests that the closer analysts' forecasts are to the earnings number announced, the smaller the forecast error (Davis *et al.*, 2000; O'Brien, 1988). Therefore, a control variable *LAG*, which measures the number of days between the most recent earnings forecasts and the fiscal year end, is included. Consistent with prior literature (Davis *et al.*, 2000; Lys and Soo, 1995), the number of analysts' forecasts included in consensus earnings forecasts and forecast dispersion also are included as control variables to control for cross-sectional differences in the information environment that may explain variation in forecast accuracy.

3.3.3.2 Testing of Hypothesis 3

As a first step in testing H3, the means of analysts' forecast errors for the audit failure and non-audit failure groups are compared using a t-test and a non-parametric Wilcoxon test. Significant lower mean analysts' forecast errors for the audit failure group compared with those of the matched control group would support the alternative hypothesis that poor actual audit quality may be associated with lower levels of analysts' forecast errors. The OLS regression model specified earlier, which includes both the variable, *AF,* and several control variables, is performed. The primary interest is the coefficient on *AF,* θ_1. A negative and significant value for θ_1 indicates that poor audit quality is associated with lower analysts' earnings forecast errors.

3.4 Conclusion

This chapter described sample selection procedure, and presented models and methods used to test the hypotheses. Dependent and independent variables contained in the models also were described and discussed. The next chapter presents and discusses the results of the data analyses.

CHATPER 4: ANALYSIS AND RESULTS

4.1 Introduction

This chapter describes the data analysis and presents results of testing the hypotheses developed in Chapter 2. The following section provides an overview of sample characteristics. The next three sections show the data analysis and results for the hypothesis testing.

4.2 Sample Characteristics

As stated in Chapter 3, the apparent audit failure cases considered in this study were identified by reviewing the SEC's AAERs and by searching news reports of financial statement restatements and litigation against auditors. The Palmrose (1999) auditor litigation database also was searched. From the above data sources, I identified 683 companies that materially misstated their annual financial statements within the period from 1980 to 2000. As this study defines apparent audit failures as cases in which auditors provide unqualified opinions on financial statements that contain material misstatements, a search of the COMPUSTAT database[8] for those companies receiving unqualified opinions was performed. Of the 683 companies, 442 companies (848 firm/years) have audit opinion information available for the specified financial statements years. Twenty-six companies (69 firm/years) were deleted because auditors issued qualified opinions to those companies. Therefore, 416 companies (779 firm/years) are included as apparent audit failures.

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[8] COMPUSTAT data item 149 provides both auditor and audit opinion information. However, it does not provide reasons why the qualified audit opinions were issued.

The sample for this study was reduced further because of absence of other data required to test specific hypotheses. In order to test H1, earnings per share, book value of stockholders' equity, and stock price data must be available from COMPUSTAT and CRSP databases. For testing H2, all variables specified in the Modified Jones Model, presented in Chapter 3, must be available from COMPUSTAT in order to estimate discretionary accruals. Testing H3 requires analysts' earnings forecast data from IBES. Given these considerations, the resulting sample of apparent audit failures for testing each hypothesis is as follows: 346 companies (616 firm/years) for testing H1, 194 companies (313 firm/years) for testing H2, and 123 companies (208 firm/years) for testing H3. See Table 1 for sample size and industry distribution information. Given the matched pairs-design used in this study, each audit failure company in the sample is matched with a control company based on year of misstated financial statements, industry, company size, and auditor type.[9]

4.3 Testing Hypothesis 1

4.3.1 Overview

Prior accounting research frequently has used a model's R^2 statistic to measure value-relevance of accounting information (e.g., Lang et al., 2003; Sami and Zhou, 2002; Francis and Schipper, 1999; Nwaeze, 1998; Collins et al., 1997; Amir and Lev, 1996; Harris et al., 1994.). These studies have measured value-relevance as the R^2 resulting from the regressions of stock prices on per share values of earnings

[9] Companies receiving qualified opinions are excluded from the matched pairs control group as well.

and book values of equity. These studies compare value-relevance measured by R^2 either over different time periods or across different samples. In this study, R^2s are compared across audit failure and non-audit failure groups to investigate whether the market assesses audit quality appropriately. Except in Harris et al. (1994), Lang et al. (2003), and Sami and Zhou (2002), value-relevance studies have not included a formal test for the difference of R^2s. For example, Collins et al. (1997) perform regressions based on the Ohlson (1995) model for different time periods which yield adjusted R^2s for those periods, they then regress adjusted R^2 on time period t. They conclude that the value relevance of earnings and book values has not declined over this period since they do not find a significant negative relationship between adjusted R^2s and the time period. Francis and Schipper (1999) adopted the same method to test whether the explanatory power of earnings for market-adjusted returns changes over time.

Sami and Zhou (2002) compare R^2s of two different samples using the Vuong test. However, the Vuong test is designed to compare R^2s of two models with the same dependent variable but different independent variables, and thus is not applicable to value relevance studies using the same independent variables for each model. Harris et al. (1994) and Lang et al. (2003) utilize the procedure demonstrated in Cramer (1987) to get the mean and variance of R^2s. They then conduct a z-test to compare the means of two R^2s. A problem with applying the Cramer method in this context is that it depends on the assumption that R^2 is normal (we note that this is not a problem if the sample size for the regression is large). However, it is not normal. Under the null that the population $R^2 \neq 0$, the density of R^2 (Anderson 2003) is:

$$\frac{\Gamma\left(\frac{1}{2}n\right)\left(1-\overline{R}^2\right)^{\frac{1}{2}n}}{\Gamma\left[\frac{1}{2}(n-p+1)\right]\Gamma\left[\frac{1}{2}(p-1)\right]}\left(R^2\right)^{\frac{1}{2}(p-3)}\left(1-R^2\right)^{\frac{1}{2}(n-p-1)}$$

$$\bullet F\left[\frac{1}{2}n,\frac{1}{2}n;\frac{1}{2}(p-1);R^2\overline{R}^2\right], \quad \text{(Equation 4.1)}$$

where F is the hypergeometric function expressed as following:

$$F(a,b;c;x)=\sum_{j=0}^{\infty}\frac{\Gamma(a+j)}{\Gamma(a)}\frac{\Gamma(b+j)}{\Gamma(b)}\frac{\Gamma(c)}{\Gamma(c+j)}\frac{x^j}{j!};$$

n is the number of observations;

p-1 is the number of independent variables.

Therefore, under the null that R^2 is not zero, the distribution of R^2 is F distribution with p-1 and n-p degrees of freedom. Because of the obvious difficulty in applying the Cramer (1987) procedure, it is not widely used-value in relevance research in accounting.

Because of the difficulty and possible unreliability[10] of using the Cramer procedure, this study uses the bootstrap method to create tests for the difference in R^2s. Bootstrapping is a resampling method that requires fewer assumptions than traditional methods and generally provides more accurate results. For example, the bootstrap method does not require normality of the distribution of the R^2 and it provides a faster convergence to the true value of the R^2.

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[10] One source of unreliability is computer operational overflow problems discussed in 3.4.

The following section presents descriptive statistics for the sample used to test H1. Next, the results of testing H1 using the Cramer (1987) procedure, following Harris et al. (1994) and Lang et al. (2003), which entails comparing confidence intervals of R^2s using the mean and standard deviation of R^2s, are presented. That is followed by an analysis implementing the bootstrap method. The testing of H1 concludes with a summary of the results of the two testing approaches.

4.3.2 Descriptive Statistics

The sample selection procedure yielded 616 firm/year observations of apparent audit failures, which were matched with a control group in order to perform the comparisons required to test H1. In the audit failure group, 502 (114) firm/years were audited by Big 8/6/5 auditors (non-Big 8/6/5 auditors). See Table 2 for the observations included in each comparison.[11]

Table 3 presents descriptive statistics, including the mean, median, and standard deviation for total assets (TA), stock prices (P), earnings per share (EPS), and book value of equity per share (BVPS) for both groups in each comparison. Table 3 also includes a comparison of the means for each of these variables. Since the distributions of these variables might not be normal, both a two-sample t-test and a nonparametric Wilcoxon test are conducted. In general, the audit failure group and matched control group are not significantly different in total assets, which reflects a successful control in company size. As larger companies tend to have Big 8/6/5 auditors, comparison 4 shows that the average company size of the audit failure

[11] Note that in comparison 4 in Table 2, 39 of the 502 audit failure cases were dropped due to inability to match these firm/years with those of a non-Big 8/6/5 control group.

group is significantly larger than that of the matched control group. In comparison 5, the Wilcoxon test results in a significant difference in company size, while the two-sample t-test does not indicate a significant difference. The control companies also appear to have better performance compared with audit failure companies. With the exception of comparison 3, the matched control groups have a higher EPS than the audit failure group.

4.3.3 Testing H1 Using Cramer (1987) Procedure

4.3.3.1 Description of Cramer (1987) Procedure

The purpose of this section is to describe the Cramer (1987) procedure in detail. Harris et al. (1994) and Lang et al. (2003) use a z-test for the difference in R^2s in two samples. A two-sample z-statistic is calculated as:

$$z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \qquad \text{(Equation 4.2)}$$

where:

$\bar{x}_1$ and $\bar{x}_2$ are the means

$\bar{x}_1$ s_1^2 and s_2^2 are the variances;

n_1 and n_2 are the numbers of observations in each sample.

As shown above, in order to conduct a z-test, one must obtain the means and variances of R^2s for the two samples. Cramer (1987) provides a procedure to calculate the mean (the first moment) and second moment of R^2. If the mean of R^2 is expressed as $E(R^2)$, the second moment is $E(R^2)^2$ and the variance of R^2 is the second moment minus the mean. The second moment can then be used to calculate the variance. Under the Cramer procedure, if k-1 is the number of independent variables, m is the number of observations, X is an m×k-1 matrix of observations of independent variables and β is k-1 vector of coefficients:

$$E\left(R^2\right) = \sum_{j=0}^{\infty} w(j) \frac{u+j}{v+j} \quad \text{(Equation 4.3)}$$

$$E\left(R^2\right)^2 = \sum_{j=0}^{\infty} w(j) \frac{u+j}{v+j} \frac{u+j+1}{v+j+1} \quad \text{(Equation 4.4)}$$

where:

$$w(j) = \frac{e^{-\frac{1}{2}} \left(\frac{1}{2}\lambda\right)^j}{j!} \quad \text{(Equation 4.5)}$$

$$u = \frac{1}{2}(k-1) \quad \text{(Equation 4.6)}$$

$$v = \frac{1}{2}(m-1) \quad \text{(Equation 4.7)}$$

$$\lambda = m \frac{\phi}{1-\phi} \quad \text{(Equation 4.8)}$$

$$\phi = \frac{\beta^{'} X^{'} X \beta}{\beta^{'} X^{'} X \beta + m\sigma^2} \quad \text{(Equation 4.9)}$$

To apply the Cramer procedure, the following three steps are performed.

Step One—Determine u and v:

Based on equations (4.6) and (4.7), u and v are determined by the number of independent variables and the number of observations, respectively.

Step Two—Determine ϕ and λ:

The term ϕ is determined through the matrix calculation specified in equation(4.9). The β is a k-1 vector of coefficients estimated from the OLS regression; σ^2 is the estimated error variance of the regression model. To get ϕ, one should set the regression model to be in a form where the intercept is zero. After determining ϕ, λ is calculated according to equation (4.8).

Step Three—Calculate the first and second moment of R^2:

To get the first and the second moment of R^2, an index j is used to calculate w(j) according to equation (4.5). We start to calculate $E(R^2)$ and $E(R^2)^2$ based on equations (4.3) and (4.4) when j=0 and then increase j until the values of $E(R^2)$ and $E(R^2)^2$ are stable and do not change with respect to an increase in j. Obviously, if w(j) approaches zero, $E(R^2)$ and $E(R^2)^2$ become stable. For example, if we continue incrementing j and find that when j reaches 50 and higher, $E(R^2)$ is always 0.1 and $E(R^2)^2$ is always 0.15, then the mean of R^2 is 0.01 and the second moment of R^2 is 0.15. After the first moment and the second moment of R^2 have been determined, the variance of R^2, VAR(R^2), can be calculated using the following equation:

$$V\left(R^2\right) = E\left(R^2\right)^2 - E\left(R^2\right) \qquad \text{(Equation 4.10)}$$

4.3.3.2 Cramer z-test

Once we have the mean and variance of R^2, we can calculate the z-statistic as in Harris et al. (1994) and Lang et al. (2003) and compare means of R^2s across two samples. The expression of equation (4.2) can be modified as follows since the number of observations of R^2 is only one for each sample:

$$z = \frac{E\left(R_1^2\right) - E\left(R_2^2\right)}{\sqrt{V\left(R_1^2\right) + V\left(R_2^2\right)}} \qquad \text{(Equation 4.11)}$$

Z-test results are presented in Table 4, along with ϕ, λ, mean(R^2), and stddev(R^2), all computed using the Cramer procedure.

As described in Chapter 3, five comparisons are made in order to see whether auditor type (Big 8/6/5 vs. non-Big 8/6/5) may have an effect on the market's ability to evaluate actual audit quality. In general, these results using the Cramer procedure suggest that there is a significant difference in R^2s for the audit failure group and the matched control group. Z-tests in all but comparison 5 show significant differences in the R^2s. Inconsistent with my expectation, the matched control group in comparison 5 has a relatively low R^2. Since this is a non-failure group audited by Big 8/6/5 auditors, I expected that its R^2 would be no lower than those of other matched control groups. However, the standard deviation of R^2 for this group is quite large compared with all other groups. A large standard deviation causes the z-test to be insignificant. One possible reason for this result is that the financial performance of this group of companies tends to be poor because this group contains some of the smallest publicly held companies that are audited by Big 8/6/5 auditors. Another interesting finding is that the failure group audited by non-Big 8/6/5 auditors has the lowest R^2 compared with all other failure groups and non-failure groups. This suggests that the market has little confidence in the relevance of accounting information for these companies.

4.3.3.3 Cramer Confidence Intervals

In this unique setting, it is preferable to test H1 by comparing confidence intervals. When confidence intervals do not overlap, we can conclude that R^2s are significantly different. In applying the two-interval test, one important issue is to determine the length of confidence intervals. Nelson (1989) shows that using 95% confidence intervals can greatly understate the significance of the test. In other words, the test would be too conservative if 95% confidence intervals were used when we required α to be 0.05. Since this study uses the conventional 0.05 as α, the length of the confidence intervals should be 83.4%.[12]

The 83.4% confidence intervals using the mean and standard deviation calculated from the Cramer procedure are illustrated in Table 5. Consistent with z-tests in the prior section, 83.4% confidence intervals do not overlap, with the exception of comparison 5. The confidence interval of the R^2 for the matched control group in comparison 5 is very wide because of the large standard deviation of R^2.

4.3.3.4 Special Problems with Cramer Procedure

As shown earlier, the Cramer procedure is complicated to apply, which may explain why it is not commonly adopted by accounting researchers. However, researchers also may encounter problems caused by computer operation overflows. Computer operation overflows occur when a number is larger than the largest number that can be represented by a computer. All computers produce "incorrect" answers because of the lack of an infinite word length to store numbers

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[12] Barr (1969) illustrates that the length of the confidence intervals for the two-interval test must be constructed with the multiplier $z' = \frac{\sqrt{n_1 + n_2}}{\sqrt{n_1} + \sqrt{n_2}} z_{0.975}$ if the significance level of 0.05 is desired. When the sample sizes of the two samples are the same, i.e., both have n observations, the multiplier becomes $z' = \frac{\sqrt{2n}}{2\sqrt{n}} z_{0..975} = \frac{\sqrt{2}}{2} z_{0.975} = 0.834$

(McCullough and Vinod, 1999). Sometimes researchers are not even aware that they are using wrong numbers produced by computers.

As illustrated earlier, w(j) needs to be calculated according to equation (4.4) in order to get the mean and the variance of R^2. The factor that determines w(j) is λ , which is a function of sample size m, the number of independent variables k-1, and R^2 from the regression. The λ is large when sample size or/and the R^2 from the regression is/are large. When λ is large, we need a large j to get the values of the mean and the second moment of R^2. In this case, the numerator component λ^j in w(j) may become a value that is even larger than the largest number a computer can represent. If expression of w(j) is not changed to avoid computer operation overflows, either no results or unreliable results would be abtained.

When calculating the mean and the second moment of R^2 for the matched control group, initial results were incorrect because of computer operation overflows. Because R^2 (0.4179) of the regression is relatively large and the sample size (616) is not small, the value of λ , which is 441, is also large. Therefore, the value j needs to be large enough to get stable values of $E(R^2)$ and $E(R^2)^2$. Using the original expression specified in equation (4.4), the computer output of $E(R^2)$ appears to be "Inf", that is, infinitely large. The computer is not able to give a valid value for w(j) simply because the numerator component λ^j was too large. Therefore, the expression of equation (4.4)was changed to $w(j) = \frac{e^{\frac{1}{2}} \left(\frac{\lambda}{2}\right)^{\frac{1}{j}} \left(\frac{\lambda}{2}\right)^{\frac{1}{j}}}{j!}$ to mitigate the problem. With this calculation, the mean of R^2 appeared to be 0.00718. Although it was a valid number, the value of the mean of R^2 was not accurate because the mean of R^2 should converge to the R^2 from above. In other words, the mean of R^2 should be very close to but larger than the R^2, which is 0.4179. If one fails to scrutinize the value of the mean of R^2, an incorrect value might be falsely assumed to be correct. This incorrect result indicated that the algorithm was insufficient. With infinity in the denominator of equation (4.2), beyond some j, all of the terms became zero instead of positive numbers and the resulting $E(R^2)$ was too small.

The results presented in Tables 4 and 5 were obtained by using an expression that is not subject to the computer operation overflow problem, by changing w(j) specified in equation (4.4) to the following expression:

$$w(j) = e^{\left(j \ln\left(\frac{1}{2}\lambda\right) - \sum_{j=0}^{\infty} \ln(j) \right)} \qquad \text{(Equation 4.12)}$$

Although the operation overflow problem can be overcome by changing the expression of w(j), users of the Cramer procedure must exercise caution. If one is not aware of this problem and does not change the expression into equation (4.12), results may not be obtained or the results obtained may be incorrect.

4.3.4 Testing H1 Using Bootstrap Confidence Intervals

4.3.4.1 Introduction of Bootstrap Methods

A superior alternative to the Cramer procedure is bootstrapping, a resampling procedure that requires fewer assumptions compared with traditional methods. For example, bootstrap methods do not require the distributions to be normal or the sample size to be large. For small sample sizes and nonlinear models, bootstrap methods can be superior to classical methods. Moreover, bootstrap methods are straightforward and do not cause computer operation overflows. Although bootstrap methods have not been widely used in accounting research, a few studies have implemented this technique in their statistical analysis (e.g., Burgstahler et al., 2002; Core and Guay, 2002; Liu et al., 2002; Willis, 2001.)

For the purpose of the current study, I created 1,000 bootstrap resamples by sampling with replacement from each of the original samples. Each bootstrap resample is the same size as the original sample.[13] For each bootstrap resample, there is one R^2 generated from the bootstrap regression, which is called R^{2*}. Therefore, the 1,000 bootstrap resamples generated 1,000 R^{2*}s.

4.3.4.2 Bootstrap Percentile Confidence Intervals

To test whether R^2s of the audit failure group and the matched control group differ, we can compare the 83.4% bootstrap percentile confidence intervals of R^2s. Figures 1-5 presents the histograms and Q-Q plots in order to provide information about the distribution of R^2 based on bootstrap resamples. The histograms and Q-Q plots of R^{2*}s for the majority of the comparisons indicate normal or approximately normal distributions. However, there are three exceptions. Two of the exceptions are the distributions of R^2s for the audit failure groups audited by non-Big 8/6/5 auditors in comparison 3 and comparison 5, which exhibit an asymmetric pattern because most R^2s from the bootstrap resamples are quite small and very close to zero. Since R^2s are non-negative values, these distributions cannot be symmetric. The third exception appears in comparison 5, where R^2s for the matched control group

[13] For example, for the original sample size of 616 firm/years, the bootstrap resamples also will contain 616 observations, but will not be identical to the set of observations in the original sample.

audited by Big 8/6/5 auditors appear to have a bimodal distribution, a probability distribution characterized by two peaks or humps rather than the more common single peak that characterizes the normal distribution. One peak is at around 0.15 and the other peak is at around 0.46. This illustrates why the standard deviation of R^2 for this group is so large. A possible reason for this phenomenon is that some companies in this group may have some other characteristics that cause the market to discount the value-relevance of their accounting information. When the distribution of R^2 is not normal, the Cramer procedure would not provide accurate results since it requires normality of R^2. However, without performing the bootstrap method, this deficiency in the results of the Cramer procedure would not be apparent.

As stated earlier, one advantage of bootstrap methods is that they do not require distributions to be normal. To create 83.4% bootstrap percentile confidence intervals, the 1,000 R^{2*}s from bootstrap regressions were sorted in ascending order. The lower value of the confidence interval is the 83rd (0.083*1000) R^{2*} and the upper value is the 917th (0.917*1000) R^{2*}. The results of the bootstrap percentile confidence intervals are shown in Table 6. In general and consistent with results using the Cramer procedure, comparisons of bootstrap percentile confidence intervals indicate significant differences in R^2s for the audit failure group and the matched control group. Except for comparison 5, confidence intervals do not overlap. In comparison 5, the confidence interval for the matched non-failure group is very wide because of the bimodal distribution of R^2.

4.3.4.3 Bootstrap Percentile t Confidence Intervals

In addition to considering the bootstrap percentile confidence intervals for R^2s, this study also presents bootstrap percentile t confidence intervals since they converge on the true R^2 value faster than percentile confidence intervals and may provide more accurate results. A bootstrap percentile t confidence interval is a confidence interval based on the t statistic of R^2 from each bootstrap resample. The standard deviation of R^{2*}s is computed using the Cramer (1987) procedure. Then a t-statistic for each R^{2*} is calculated based on the following equation:

$$t_i^* = \frac{R_i^{2*} - R^2}{stddev\left(R_i^{2*}\right)} \qquad \text{(Equation 4.13)}$$

where:

i is the ith bootstrap resample;

R^2 is R^2 from the regression using the original sample;

R_i^{2*} is R^2 from the ith bootstrap regression; and,

$stddev\left(R_i^{2*}\right)$ is the standard deviation of R^2 from the ith bootstrap regression using the Cramer procedure.

Before considering the results for the bootstrap percentile t confidence intervals, the distribution of t^*s must be examined by looking at histograms and Q-Q plots for the five comparisons. See Figures 1-5 for histograms and Q-Q plots for t^* distributions for each comparison. Computing the t-statistic is a procedure of standardizing R^2s based on the bootstrap resamples. If the distribution of R^2 is initially normal or near normal, the distribution of t^*s should be standard normal or near standard normal. Except for the failure group audited by non-Big 8/6/5 auditors and the matched control group audited by Big 8/6/5 auditors in comparison 5, the histograms and Q-Q plots suggest standard normal or approximately standard normal distributions with the mean zero or near zero. Since the distribution of R^2s for the matched control group in comparison 5 is bimodal, distribution of t^*s is also bimodal after removing some extreme values.

To create 83.4% bootstrap percentile t confidence intervals, 1,000 t^*s from bootstrap resamples are sorted in ascending order. The 83rd and 917th t^*s are used to calculate the lower and upper values of the interval based on the following equations:

$$lower \quad value \quad = R^2 - stddev\left(R^2\right) \bullet t^*_{917} \qquad \text{(Equation 4.14a)}$$

$$upper \quad value \quad = R^2 - stddev\left(R^2\right) \bullet t^*_{83} \qquad \text{(Equation 4.14b)}$$

The bootstrap percentile t confidence intervals are shown in Table 7. In general, with the exception of comparison 5, these results also suggest significant differences in R^2s between the audit failure group and the matched control group.

4.3.5 Summary

In this study, both the Cramer procedure and the bootstrap method are used to create formal tests for differences in R^2s across samples. In general, the results suggest that the value relevance of earnings and book values of equity is lower for companies experiencing apparent audit failures than for companies that have not experienced apparent audit failures. Although the market may exhibit less confidence in accounting information from companies audited by non-Big 8/6/5 auditors, the results provide evidence that the market generally exhibits less confidence in companies experiencing audit failure, regardless of their auditors' size. These results provide support for H1 that the explanatory power of accounting information of companies experiencing apparent auditor failures is lower than that of companies that have not experienced apparent auditor failures.

4.4 Testing Hypothesis 2

The following section provides descriptive statistics for the sample selected for testing H2. Next, the testing results are presented.

4.4.1 Descriptive Statistics

Table 8 reports descriptive statistics for the 313 companies experiencing apparent audit failures and the matched control group used to test H2. Based on the two-sample t-tests, there are no significant differences between the audit failure group and the matched control group in company size (TA), discretionary accruals (DAC), the market to book ratio (MTB), leverage (LEV), and operating cash flows (OCF). The only significant difference between the two groups is the absolute value of total accruals (ABTAC). However, the validity of the t-test depends on the assumption of normal distributions of the variables being compared. Therefore, the nonparametric Wilcoxon two-sample test results also are provided. Wilcoxon tests show significant differences in LEV, OCF, and ABTAC between the two groups.

4.4.2 Testing Results

To test H2, the means of DAC for the audit failure group are compared with the matched control group. The two-sample t-test does not show a statistical difference between the two groups. However, the distribution of DAC appears to be highly skewed as the mean is far greater than the median for both groups. Given this violation of the normality assumption, the nonparametric Wilcoxon two-sample test provides a more reliable indication of the difference between the groups. I find a significant difference in discretionary accruals (DAC) based on the Wilcoxon test. Consistent with H2, the audit failure group in general shows a higher level of DAC (0.632667) compared with the matched control group (0.590241).

To confirm this result, the regression model proposed in Chapter 3 is used to test H2. Table 9 reports Pearson (upper diagonal) and Spearman (lower diagonal) correlation coefficients among all variables included in testing H2. All significant correlations are bold. Although the Pearson correlation between the dummy variable and DAC is insignificant, the Spearman correlation is significantly positive indicating higher discretionary accruals for the audit failure group. The Spearman correlation should provide a more accurate result in this case since the distribution of DAC is not normal. The Pearson correlation is reliable only when the normal distribution assumption is valid.

Based on the regression results reported in Table 10, the coefficient on the dummy variable AF is positive but insignificant. One possible reason for this insignificance might be the relatively low power of the Modified Jones Model in detecting earnings management. Prior literature suggests that the power of discretionary models in detecting earnings management is low.

4.4.3 Summary

In order to test whether apparent audit failures are associated with higher levels of earnings management, the means of DAC of the audit failure group and the matched control group are compared. Due to violations of the underlying assumptions of linear regression, the specified regression model did not yield persuasive evidence for accepting H2. However, the nonparametric Wilcoxon two-sample test suggests that the audit failure group exhibits a higher level of discretionary accruals compared with the matched control group. This finding provides support for H2, that companies experiencing apparent audit failures exhibit higher levels of earnings management.

4.5 Testing Hypothesis 3

This section provides descriptive statistics for the sample selected for testing H3, followed by the results of testing H3.

4.5.1 Descriptive Statistics

There are 123 audit failure companies with required analysts' forecast data available on IBES. These companies yield a total of 208 firm/year observations. Of the 208 observations, only one firm/year is audited by a non-Big 8/6/5 auditor. This is consistent with analysts tending to follow only large companies, which in turn are more likely to be audited by Big 8/6/5 auditors. Descriptive statistics for the audit failure group and the matched control group are reported in Table 11. Two-sample t-tests do not show any significant differences between the audit failure group and the matched control group in total assets (TA), EPS, median analysts' forecasted earnings (FCEPS), analysts' forecast errors[14] (FE), the number of forecasts, dispersion of forecasts (STD), and the lag between forecast dates and fiscal year end (LAG). The nonparametric Wilcoxon test shows significant difference in EPS and FCEPS between the two groups. Surprisingly, the forecasted earnings of audit failure companies are higher compared with the control companies, while their actual reported earnings are lower.

4.5.2 Testing Results

To test H3, the means of FE are compared between the audit failure group and the matched control group. As developed in Chapter 2, H3 presents an expectation that the audit failure group would have a lower level of FE. Although the mean of FE for the audit failure group (0.9959615) is lower than the mean of FE for the matched control group (1.959375), the difference is not statistically significant based on either the two-sample t-test or the Wilcoxon test. As indicated by the Wilcoxon test, the forecasted earnings for the audit failure group is statistically higher compared with the matched control group. This systematic difference may reduce the ability of this comparison to find a significantly lower FE for the audit failure group. If analysts' forecasted earnings of the audit failure group are biased upward to a greater extent relative to the matched control group, it would be more difficult for the failure group to meet forecasted earnings and to minimize the difference between reported and forecasted earnings. Furthermore, the audit failure

[14] Analysts' forecast errors are calculated as the absolute value of the difference between the median analysts' forecasted EPS and the actual reported EPS.

group exhibits a higher level of leverage compared with the matched control group. This may suggest that companies in the audit failure group are more likely to be financially distressed. Consistent with prior research (e.g., Becker et al., 1998), the results of testing H2 may indicate that leverage reduces the magnitude of discretionary accruals because auditors may perceive higher risk and respond by making more conservative audit judgments for such companies. Therefore, the ability of companies in the audit failure group to manage earnings to meet analysts' earnings forecasts might be limited.

Table 12 provides Pearson and Spearman correlations. There are no significant correlations between AF and all other control variables. Consistent with the result the comparison of the means of FE, the regression analysis does not show a significantly negative relationship between analysts' forecast errors and AF[15] (see regression results in Table 13).[16] Because the forecasted earnings for the audit failure group are higher than the matched control group, while the audit failure group's earnings are lower, it is relatively more difficult for audit failure companies to meet analysts' forecasts. Such difficulty may be causing analysts' forecast errors to be large.

4.5.3 Summary

Based on the results of this testing, analysts' forecast errors for the audit failure group are not significantly different from those of the matched control group.

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[15] Mean analysts' analysts' forecast yield similar results.
[16] To ensure that these results are not driven by differences in EPS between the two groups, this analysis was also performed using total earnings and forecasted earnings. Similar results were obtained.

Therefore, H3, that companies experiencing apparent audit failures exhibit lower levels of analysts' forecast errors than companies that have not experienced apparent audit failures, is not supported by these results.

CHAPTER 5: CONCLUSIONS

5.1 Overview

This chapter provides a summary of the current study. The following sections present the conclusions of testing results, limitations of the study, and contributions as well as implications for future research.

5.2 Conclusions

The findings for the three hypotheses tested in this study are summarized in this section.

5.2.1 Perceived Audit Quality and Actual Audit Quality

This study first examines whether market-perceived audit quality captures actual audit quality as measured by apparent audit failures. This study uses the value-relevance of accounting information as the measure for market-perceived audit quality. Companies experiencing an apparent audit failure are matched with similar companies not experiencing an apparent audit failure. Then, comparisons are made between the audit failure group and a matched-control group. In general, accounting information is less value-relevant for the audit failure group than for the matched control group.[17]

In comparison 1, the result shows that the value-relevance of accounting information for all audit failure companies is lower than for matched control companies. In comparisons 2 and 3, comparisons are made between audit failure

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[17] That is, accounting information explains significantly less of the variation in stock price for companies experiencing apparent audit failures.

groups and matched control groups within the same auditor types. Results show that the value-relevance of accounting information for audit failure companies audited by Big 8/6/5 (non-Big 8/6/5 auditors) is less than for the matched non-audit failure companies audited by Big 8/6/5 (non-Big 8/6/5) auditors. Therefore, the market appears to differentiate between companies with audit quality differences. Moreover, in comparison 4, accounting information provided by companies experiencing audit failures and audited by Big 8/6/5 auditors is less value-relevant compared with companies that have not experienced audit failures and are audited by non-Big 8/6/5 auditors. This result suggests that the market's ability to evaluate audit quality is not affected by perceived audit quality as proxied by auditor size. Thus, as illustrated in comparisons 1 through 4, the results indicate that the market appears to assess actual audit quality accurately.

However, inconsistent with my expectation, comparison 5 does not show any difference in the value-relevance of accounting information between the audit failure companies audited by non-Big 8/6/5 auditors and the matched control companies audited by Big 8/6/5 auditors. As indicated in Chapter 4, the insignificant difference in value-relevance between the two groups in comparison 5 is most likely attributable to the special sample characteristics of the matched control group.

5.2.2 Actual Audit Quality and Earnings Management

This study also examines the association between actual audit quality and earnings management. Following prior studies, earnings management is measured by discretionary accruals estimated using the Cross-Sectional Modified Jones Model. Based on a nonparametric two-sample test, the audit failure group shows higher discretionary accruals than the matched control group. This result provides support for the hypothesis that poor actual audit quality is related to a higher level of earnings management confirming prior research which finds significant association between perceived quality and earnings management (e.g., Becker et al., 1998). Companies experiencing audit failure appear to engage in earnings management to a significantly greater extent than companies not experiencing audit failure. The result suggests that discretionary accrual measures might be suitable proxies for audit quality as such accruals are significantly associated with actual audit quality.

5.2.3 Actual Audit Quality and Financial Analysts' Forecast Errors

Since the objective of managing earnings may be to meet analyst's earnings forecasts, this study also investigates whether actual audit quality is related to analysts' forecast errors. The results of this study do not reveal any statistically significant relationship between actual audit quality and financial analysts' forecast errors. There are some possible reasons for the insignificant result. First, analysts' forecasted earnings might have more upward bias for the audit failure group than for the matched control group, which makes it more difficult for the audit failure group to meet earnings targets. It is possible that companies experiencing apparent audit failures have attempted to influence analysts' earnings forecasts to bias forecasted earnings upward. This upward bias would tend to drive up stock prices.

This would allow insiders aware of accounting problems to sell stock at higher prices.

Second, on average, the audit failure group exhibits a higher level of leverage compared with the matched control group. This may indicate that companies in the audit failure group are more likely to be financially distressed. Therefore, the main purpose for engaging in earnings management may be to avoid debt covenants and being forced into bankruptcy. Thus, the necessity to mislead creditors may take precedence over attempting to manage earnings to meet analysts' forecasts. As previous research and the results of this study indicate, leverage reduces the magnitude of discretionary accruals because auditors may perceive greater risk and may exercise more scrutiny for clients with higher leverage, implying that auditors tend to constrain earnings management more effectively in more highly leveraged clients. Thus, auditors may be relatively successful in limiting the audit failure companies' ability to manage earnings to meet analysts' forecasts.

5.3 Limitations of the Study

The conclusions of this study are subject to several limitations. First, although a search for apparent audit failures was conducted using AAERs, news of restatements, and news of litigation against auditors, the sample may not include all cases of apparent audit failure. Moreover, there also might be unobserved audit failures in addition to the apparent audit failures included from these three sources. However, this limitation would reduce the likelihood of finding significant results. Specifically, if some audit failures are not included in the audit failure sample in this study and instead are included in the matched control group, hypothesis testing would have less power to find significant differences between the two groups.

Second, in testing Hypothesis 1 using comparison 5, audit failure companies audited by non-Big 8/6/5 auditors are compared with matched companies audited by Big 8/6/5 auditors. However, the result does not show any difference in value-relevance between the audit failure group and the matched control group, which is not consistent with prior research employing the size proxy or with the expectation of this study. The comparison of companies experiencing apparent audit failures and audited by non-Big 8/6/5 auditors with non-audit failure companies audited by Big 8/6/5 auditors should have shown a difference in value-relevance of accounting information between the two groups. The insignificant result may be caused by some unusual sample characteristics of the matched control group. If this is the case, some other characteristics, such as company performance, may be a more relevant basis for comparison.

Finally, the sample used in testing the relationship between actual audit quality and financial analysts' forecast errors may not be representative of all companies. Only relatively large companies were included in the sample; many small companies were dropped from the sample because earnings forecast data are not available for them. Therefore, these results may not hold for smaller companies.

5.4 Contributions and Implications for Future Research

This study has several implications for audit quality research. The results of this study suggest that market-perceived audit quality, which is measured by value-relevance of accounting information, captures actual audit quality. When there is a lack of an actual audit quality proxy such as subsequent recognition of audit failures, accounting researchers may have confidence in relying on a market-perceived audit quality proxy. For example, value-relevance of accounting information can be considered as a measure of actual audit quality for a group of companies in testing whether certain factors affect audit quality. Also, consistent with prior research, discretionary accruals can be considered as an alternative measure of actual audit quality since companies experiencing apparent audit failures exhibit on average relatively high levels of discretionary accruals. The findings of this study suggest that companies experiencing apparent audit failures exhibit higher levels of earnings management compared with companies that have not experienced apparent audit failures. Accordingly, this study validates prior audit quality research (e.g., Becker *et al*., 1998) that has found a relationship between earnings management and perceived audit quality measures (i.e., auditor size).

This study, by applying the bootstrap method for testing differences in R^2s and by providing a detailed exposition of this method, also contributes to value-relevance research that measures model explanatory power. The bootstrap method requires fewer assumptions and provides more accurate results compared with traditional testing methods. Furthermore, this study demonstrates in detail how to apply the Cramer procedure to obtain the mean and standard deviation of R^2. The testing methods adopted in this study have implications for future value-relevance accounting research because they provide alternative formal tests for the difference in R^2s.

Although this study expected that the objective of earnings management in companies experiencing audit failures would be to meet analysts' earnings forecasts, analysts' forecast errors for those companies are not significantly smaller than for companies that have not experienced audit failures. These results indicate that managers of audit failure companies may have some other incentives for managing earnings. For example, earnings management may be directed toward avoiding debt covenant violations. Future research could investigate whether other factors, such as board and financial characteristics, may have an effect on earnings management.

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APPENDIX: TABLES AND FIGURES

Table 1: Sample Size and Industry Distribution

Panel A: Apparent Audit Failure Cases Included to Test H1

Audit failure cases:	416 companies	779 firm/years
Less: observations without price data:	70 companies	163 firm/years
Sample for testing H1:	**346 companies**	**616 firm/years**

Industry	SIC Code	Number of Observations	Percentage
Agriculture, Forestry, Fishing	01-09	1	0.29%
Mining	10-14	15	4.34%
Construction	15-17	7	2.02%
Manufacturing	20-39	127	36.71%
Transportation & Public Utilities	40-49	31	8.96%
Wholesale Trade	50-51	12	3.47%
Retail Trade	52-59	38	10.98%
Finance, Insurance, Real Estate	60-67	28	8.09%
Services	70-89	82	23.70%
Public Administration	90-99	5	1.45%
Subtotal		346	100.00%

Table 1 (continued)

Panel B: Apparent Audit Failure Cases Included to Test Hypothesis 2

Audit failure cases:	416 companies	779 firm/years
Less: observations without required Compustat variables:	222 companies	466 firm/years
Sample included for testing H2:	**194 Companies**	**313 firm/years**

Industry	SIC Code	Number of Observations	Percentage
Agriculture, Forestry, Fishing	01-09	1	0.52%
Mining	10-14	5	2.58%
Construction	15-17	4	2.06%
Manufacturing	20-39	69	35.57%
Transportation & Public Utilities	40-49	17	8.76%
Wholesale Trade	50-51	8	4.12%
Retail Trade	52-59	19	9.79%
Finance, Insurance, Real Estate	60-67	5	2.58%
Services	70-89	65	33.51%
Public Administration	90-99	1	0.52%
Subtotal		194	100.00%

Table 1 (continued)

Panel C: Apparent Audit Failure Cases Included to Test H3

Audit failure cases:	416 companies	779 firm/years
Less: observations without required forecasts variables:	293 companies	571 firm/years
Sample included for testing H2:	**123 Companies**	**208 firm/years**

Industry	SIC Code	Number of Observations	Percentage
Mining	10-14	5	4.07%
Construction	15-17	3	2.44%
Manufacturing	20-39	53	43.09%
Transportation & Public Utilities	40-49	10	8.13%
Wholesale Trade	50-51	2	1.63%
Retail Trade	52-59	13	10.57%
Finance, Insurance, Real Estate	60-67	6	4.88%
Services	70-89	30	24.39%
Public Administration	90-99	1	0.81%
Subtotal		123	100.00%

Table 2: Observations in Each Comparison

	Audit Failure Group	Matched Control Group
	Comparison 1	
Number of Observations	616	616
Big auditors	502	502
Non-Big auditors	114	114
	Comparison 2	
Number of Observations	502	502
Big auditors	502	502
Non-Big auditors	0	0
	Comparison 3	
Number of Observations	114	114
Big auditors	0	0
Non-Big auditors	114	114
	Comparison 4	
Number of Observations	463	463
Big auditors	463	0
Non-Big auditors	0	463
	Comparison 5	
Number of Observations	114	114
Big auditors	0	114
Non-Big auditors	114	0

Table 3: Descriptive Statistics for Observations Included in Testing H1

Comparison 1

	Auditor Failure Group			Matched Control Group			Compare Means[a]	
	Mean	Median	Stddev	Mean	Median	Stddev	T-test	Wilcoxon Test
TA	2421.1010	135.5100	8309.7470	1860.2880	114.5100	6508.7950	0.1875	0.332
P	17.4288	12.2500	17.7024	18.3725	12.0630	22.4992	0.4135	0.9602
EPS	-0.0065	0.3450	7.0179	0.7458	0.5000	5.7049	**0.0392**	**0.0022**
BVPS	7.6564	12.2500	9.7234	8.6550	5.7230	16.2675	0.1913	0.2421

Comparison 2

	Auditor Failure Group			Matched Control Group			Compare Means	
	Mean	Median	Stddev	Mean	Median	Stddev	T-test	Wilcoxon Test
TA	2958.4940	224.6000	9121.2050	2243.6640	182.2900	7122.9120	0.1667	0.2256
P	19.4984	14.7500	17.9248	21.2554	15.2500	23.8012	0.1867	0.5052
EPS	0.01631	0.4900	7.7616	0.9306	0.7850	6.2850	**0.0405**	**0.0007**
BVPS	8.7918	6.2610	10.2356	9.9054	6.9360	17.6025	0.2208	0.3822

Comparison 3

	Auditor Failure Group			Matched Control Group			Compare Means	
	Mean	Median	Stddev	Mean	Median	Stddev	T-test	Wilcoxon Test
TA	54.6836	16.7150	138.4634	172.0858	15.0150	1447.4700	0.3904	0.9080
P	8.3157	4.0000	13.3492	5.6772	3.4380	6.6272	0.0605	0.2113
EPS	-0.1072	-0.0100	0.9703	-0.0679	0.0200	1.0853	0.7734	0.8574
BVPS	3.1489	1.1916	4.3721	2.6570	1.7497	5.3825	0.4496	0.0890

Comparison 4

	Auditor Failure Group			Matched Control Group			Compare Means	
	Mean	Median	Stddev	Mean	Median	Stddev	T-test	Wilcoxon Test
TA	3008.3940	211.5500	9391.1080	1393.2470	64.5000	9913.3340	**0.0111**	**0.0000**
P	19.6246	14.5000	18.3666	15.1947	8.8750	22.0622	**0.0009**	**0.0000**
EPS	-0.0472	0.4700	8.0709	0.5576	0.3700	1.6394	0.1147	0.9536
BVPS	8.5995	6.1680	10.4589	7.8357	4.9530	13.6130	0.3386	**0.0002**

Comparison 5

	Auditor Failure Group			Matched Control Group			Compare Means	
	Mean	Median	Stddev	Mean	Median	Stddev	T-test	Wilcoxon Test
TA	54.6836	16.7150	138.4634	46.9001	23.3100	70.6154	0.5932	**0.0426**
P	8.3157	4.0000	13.3492	10.3906	6.7500	14.9525	0.2691	**0.0038**
EPS	-0.1072	-0.0100	0.9703	0.1656	0.0900	1.3441	0.0796	**0.0309**
BVPS	3.1489	1.1916	4.3721	4.7300	3.3794	5.4881	0.0018	**0.0000**

TA: Total asset at the end of the fiscal year t;
P: Stock price, 3 month after the end of the fiscal year t;
EPS: Earnings per share excluding extraordinary items for fiscal year t;
BVPS: Book value of equity per share at the end of the fiscal year t;

a. Both p-values of the two-sample t-test and the nonparametric two-sample Wilcoxonon test are given.

Table 4: Comparison of R^2s Using z-test Based on Cramer Procedure
Regression Model: $P_{it} = \alpha_1 EPS_{it} + \alpha_2 BVPS_{it}$

Comparison		Failure Group	Non-Failure Group
1	Auditor	Both Big non-Big auditor	Both Big non-Big auditor
	m	616	616
	R^2	0.1714	0.4179
	ϕ	0.1710	0.4171
	λ	127.0466	440.8363
	Mean(R^2)	0.1735	0.4190
	Stddev(R^2)	0.0264	0.0270
	z-statistic	**6.4977*** **	
2[a]	Auditor	Big auditor	Big auditor
	m	502	502
	R^2	0.1555	0.4129
	ϕ	0.1550	0.4120
	λ	92.0976	351.7144
	Mean(R^2)	0.1582	0.4142
	Stddev(R^2)	0.0286	0.0210
	z-statistic	**6.1826*** **	
3[b]	Auditor	Non-Big auditor	Non-Big auditor
	m	114	114
	R^2	0.0266	0.3555
	ϕ	0.0261	0.3515
	λ	3.0559	61.7820
	Mean(R^2)	0.0353	0.3624
	Stddev(R^2)	0.0369	0.0651
	z-statistic	**4.3668*** **	
4[a]	Auditor	Big auditor	Non-Big auditor
	m	463	463
	R^2	0.1628	0.4827
	ϕ	0.1622	0.4816
	λ	89.6446	430.1949
	Mean(R^2)	0.1656	0.4839
	Stddev(R^2))	0.0301	0.0291
	z-statistic	**7.6015*** **	

Table 4 (continued)

5[b]	Auditor	Non-Big auditor	Big auditor
	m	114	114
	R^2	0.0266	0.1939
	ϕ	0.0261	0.1911
	λ	3.0559	26.9346
	Mean(R^2)	0.0353	0.2046
	Stddev(R^2)	0.0369	0.1939
	z-statistic	0.8578	

a. In comparison 2 and 4, audit failure group is the same group except the number of observations differs. Failure group in both comparisons represents companies audited by Big auditors. In comparison 4, I dropped some failure group companies since I cannot find the matched pairs audited by non-Big auditors.
b. In comparison 3 and 5, audit failure group is the same group since it represents audit failure companies audited by non-Big auditors.

*** Significant at 0.01
** Significant at 0.05
* Significant at 0.1

Table 5: Comparisons of Confidence Intervals for R^2s Based on Cramer Procedure

Regression Model: $P_{it} = \alpha_1 EPS_{it} + \alpha_2 BVPS_{it}$

Comparison		Failure Group	Non-Failure Group
1	Auditor	Both Big and non-Big auditor	Both Big and non-Big auditor
	83% CI	**(0.1369, 0.2101)**	**(0.3816, 0.4564)**
2	Auditor	Big auditor	Big auditor
	83% CI	**(0.1187, 0.1978)**	**(0.3727, 0.4558)**
3	Auditor	Non-Big auditor	Non-Big auditor
	83% CI	**(-0.0159, 0.0865)**	**(0.2721, 0.4526)**
4	Auditor	Big auditor	Non-Big auditor
	83% CI	**(0.1240, 0.2073)**	**(0.4436, 0.5242)**
5	Auditor	Non-Big auditor	Big auditor
	83% CI	(-0.0157, 0.0865)	(-0.0639, 0.4731)

Table 6: Comparisons of Bootstrap Percentile Confidence Intervals for R^2s
Regression Model: $P_{it} = \alpha_1 EPS_{it} + \alpha_2 BVPS_{it}$

Comparison		Failure Group	Non-Failure Group
1	Auditor	Both Big and non-Big auditor	Both Big and non-Big auditor
	83% Bootstrap Percentile CI	**(0.1344, 0.2234)**	**(0.3555, 0.4825)**
2	Auditor	Big auditor	Big auditor
	83% Bootstrap Percentile CI	**(0.1175, 0.2072)**	**(0.3520, 0.4877)**
3	Auditor	Non-Big auditor	Non-Big auditor
	83% Bootstrap Percentile CI	**(0.0068, 0.1161)**	**(0.2640, 0.5030)**
4	Auditor	Big auditor	Non-Big auditor
	83% Bootstrap Percentile CI	**(0.1229, 0.2207)**	**(0.3965, 0.6054)**
5	Auditor	Non-Big auditor	Big auditor
	83% Bootstrap Percentile CI	(0.0068, 0.1161)	(0.0822, 0.5369)

Table 7: Comparisons of Bootstrap Percentile Confidence Intervals for R^2s
Regression Model: $P_{it} = \alpha_1 EPS_{it} + \alpha_2 BVPS_{it}$

Comparison		Failure Group	Non-Failure Group
1	Auditor	Both Big and non-Big auditor	Both Big and non-Big auditor
	83% Bootstrap Percentile t CI	**(0.1232, 0.2110)**	**(0.3489, 0.4779)**
2	Auditor	Big auditor	Big auditor
	83% Bootstrap Percentile t CI	**(0.1071, 0.1970)**	**(0.3322, 0.4717)**
3	Auditor	Non-Big auditor	Non-Big auditor
	83% Bootstrap Percentile t CI	**(-0.0582, 0.0596)**	**(0.1934, 0.4461)**
4	Auditor	Big auditor	Non-Big auditor
	83% Bootstrap Percentile t CI	**(0.1084, 0.2061)**	**(0.3384, 0.5621)**
5	Auditor	Non-Big auditor	Big auditor
	83% Bootstrap Percentile t CI	(-0.0582, 0.0596)	(-0.1012, 0.3319)

Table 8: Descriptive Statistics for Observations Included in Testing H2

	All N=616			Audit Failure Group N=313			Matched Control Group N=313			Compare Means	
	Mean	**Median**	**Stddev**	**Mean**	**Median**	**Stddev**	**Mean**	**Median**	**Stddev**	**T-test**	**Wilcoxon Test**
TA	2388.2100	120.6100	8539.0550	2794.9110	140.1600	10186.0700	1981.5090	107.6100	6478.9400	0.2338	0.6582
MTB	2.9980	2.1740	10.5046	3.4395	2.2200	9.0666	2.5571	2.1240	11.7666	0.2937	0.4168
LEV	0.1870	0.1172	0.1985	0.2017	0.1347	0.2056	0.1723	0.0836	0.1904	0.0637	**0.0527**
OCF	199.1160	3.5250	986.9473	184.3836	1.4900	1023.1420	213.8475	5.3100	950.7874	0.7091	**0.0018**
ABTAC	165.7160	8.7650	713.7503	0.2336	0.0977	0.4739	0.1506	0.0828	0.3447	**0.0125**	**0.0028**

TA: Total asset at the end of the fiscal year t;
DAC: Absolute value of discretionary accruals estimated using the Modified Jones Model;
MTB: Market to book ratio;
LEV: Leverage, calculated as long-term debt divided by total assets;
OCF: Cash flows from operating activities;
ABTAC: Absolute value of total accruals.

Table 9: Correlation Matrix[a] for Variables in Testing H2

	DAC	AF	MTB	LEV	LGTA	ABTAC	OCF
DAC	1.0000	0.0102	0.0506	**-0.0982**	-0.0117	**0.0794**	**0.1445**
AF	**0.1135**	1.0000	0.0420	0.0742	0.0256	0.0101	-0.0149
MTB	0.0728	0.0325	1.0000	**-0.1836**	0.0113	0.0170	0.0189
LEV	**-0.2089**	**0.0775**	**-0.1559**	1.0000	**0.2424**	0.0494	0.0333
LGTA	**-0.1327**	0.0177	0.0297	**0.3298**	1.0000	**0.4566**	**0.4274**
ABTAC	0.0627	0.0632	0.0487	**0.2616**	**0.8642**	1.0000	**0.9181**
OCF	**-0.2306**	**-0.1247**	**0.0934**	**0.1739**	**0.6247**	**0.5083**	1.0000

DAC: The absolute value of discretionary accruals estimated using Modified Jones Model
AF: audit failure, a dummy variable with value 1 indicating audit failure company and 0 indicating the control company;
MTB: Market to book ratio;
LEV: Leverage, calculated as the long-term debt divided by total assets;
LGTA: Natural logarithm of total assets;
ABTAC: The absolute value of total accruals;
OCF: Cash flows from operating activities.

a: Pearson correlations are reported in the upper diagonal; Spearman correlations are reported in the lower diagonal**.**

Table 10: Results for Testing H2

Panel A: Comparing Means

Audit Failure Group			Matched Control Group			Compare Means	
Mean	Median	Std.Dev	Mean	Median	Std.Dev.	t-test	Wilcoxon Test
0.6327	0.1562	2.0465	0.5902	0.1114	2.1380	0.7999	**0.0045**

Panel B: Regression Analysis

$$DAC_{it} = \beta_0 + \beta_1 AF + \beta_2 LGTA + \beta_3 MTB + \beta_4 LEV + \beta_5 OCF + \beta_6 ABTAC$$

	Coefficient	Std. Error	t value	P value
(Intercept)	0.8623	0.2275	3.7900	0.0002
AF	0.1091	0.1646	0.6630	0.5077
LGTA	-0.0388	0.0412	-0.9410	0.3468
MTB	0.0063	0.0080	0.7860	0.4319
LEV	-0.8808	0.4357	-2.0210	**0.0437**
OCF	0.0010	0.0002	4.5930	**0.0000**
ABTAC	-0.0009	0.0003	-3.1360	**0.0018**
Rsquare	0.0513		Adj. Rsquare	0.0421
F-statistic:	5.5750		p-value:	0.0000

DAC: The absolute value of discretionary accruals estimated using Modified Jones Model
AF: audit failure, a dummy variable with value 1 indicating audit failure company and 0 indicating the control company;
MTB: Market to book ratio;
LEV: Leverage, calculated as the long-term debt divided by total assets;
LGTA: Natural logarithm of total assets;
ABTAC: The absolute value of total accruals;
OCF: Cash flows from operating activities.

Table 11: Descriptive Statistics for Observations Included in Testing H3

	All N=416			Audit Failure Group N=208			Matched Control Group N=208			Compare Means	
	Mean	**Median**	**Stddev**	**Mean**	**Median**	**Stddev**	**Mean**	**Median**	**Stddev**	**T-test**	**Wilcoxon Test**
TA	3768.1000	513.8400	3.2529	4316.3710	533.2465	10479.0000	3219.8290	504.0050	7707.5650	0.2248	0.6260
EPS	1.3300	0.9300	6.5053	0.8060	0.8650	1.4440	1.8539	1.0650	9.0667	0.1012	**0.0128**
FCEPS	1.0861	0.9000	3.2529	1.2492	0.9450	1.6929	0.9230	0.7550	4.2772	0.3073	**0.0309**
N	9.4980	6.0000	8.4918	9.7981	7.0000	8.6072	9.1971	6.0000	8.3847	0.5010	0.4924
STD	0.1258	0.0300	0.5049	0.1104	0.0300	0.2482	0.1412	0.0300	0.6700	0.5357	0.5404
LAG	105.5000	106.0000	2.0393	105.3990	106.0000	2.0381	105.6202	106.0000	2.0395	0.2693	0.2648

TA: Total assests;
EPS: Earnings per share excluding extraordinary items;
FCEPS: Analysts' median forecasted EPS;
FE: Forecast errors, calculated as absolute value of the difference of forecasted EPS and reported EPS;
N: Number of analysts' forecasts;
STD: Standard deviation of analysts' median earnings forecasts.
LAG: The lag between forecast dates and the fiscal year end.

Table 12: Correlation Matrix[a] for Variables in Testing H3

	FE	AF	LGTA	LAG	N	STD
FE	1.0000	-0.0721	0.0657	0.0734	-0.0151	**0.1632**
AF	-0.0394	1.0000	0.0297	-0.0543	0.0354	-0.0305
LGTA	**0.1731**	0.0239	1.0000	0.0917	**0.6492**	**0.1160**
LAG	0.0290	-0.0548	0.0740	1.0000	0.0008	0.0391
N	**0.1158**	0.0337	**0.6794**	-0.0637	1.0000	**0.1022**
STD	0.0479	0.0301	**0.2816**	-0.0560	**0.3034**	1.0000

FE: Forecast errors, calculated as the absolute value of the difference of the forecasted EPS and reported EPS;
AF: Audit failure, a dummy variable with value 1 indicating audit failure company and value 0 indicating the control company;
LGTA: Natural logarithm of total assets;
LAG: The lag between the forecasts dates and fiscal year end;
N: the number of forecasts;
STD: is the standard deviation of the median analysts' forecasts.

a: Pearson correlations are reported in the upper diagonal; Spearman correlations are reported in the lower diagonal.

Table 13: Results for Testing H3

Panel A: Comparing Means

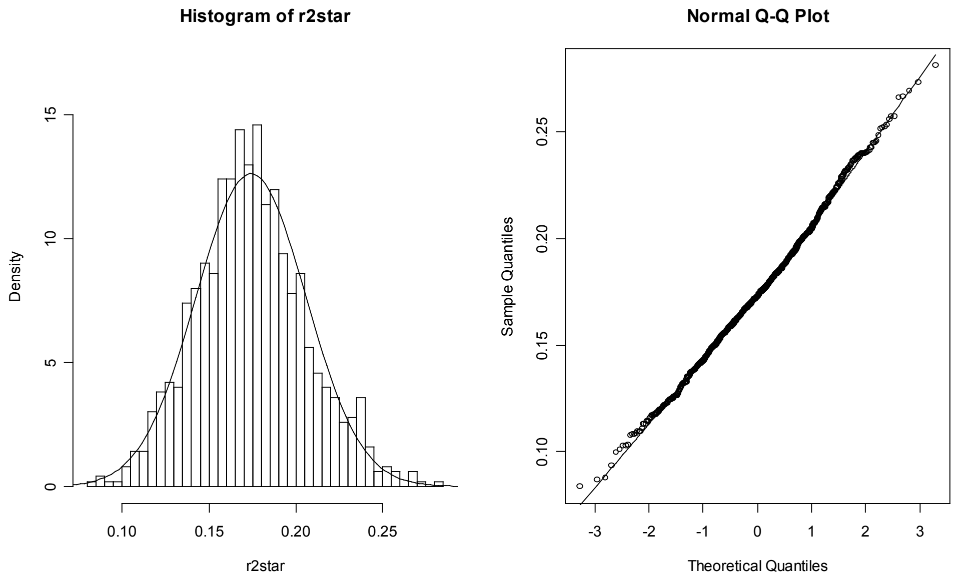
Audit Failure Group			Matched Control Group			Compare Means	
Mean	Median	Std.Dev	Mean	Median	Std.Dev.	t-test	Wilcoxon Test
0.9960	0.5250	1.6623	1.9594	0.5600	9.2967	0.1427	0.4220

Panel B: Regression Analysis

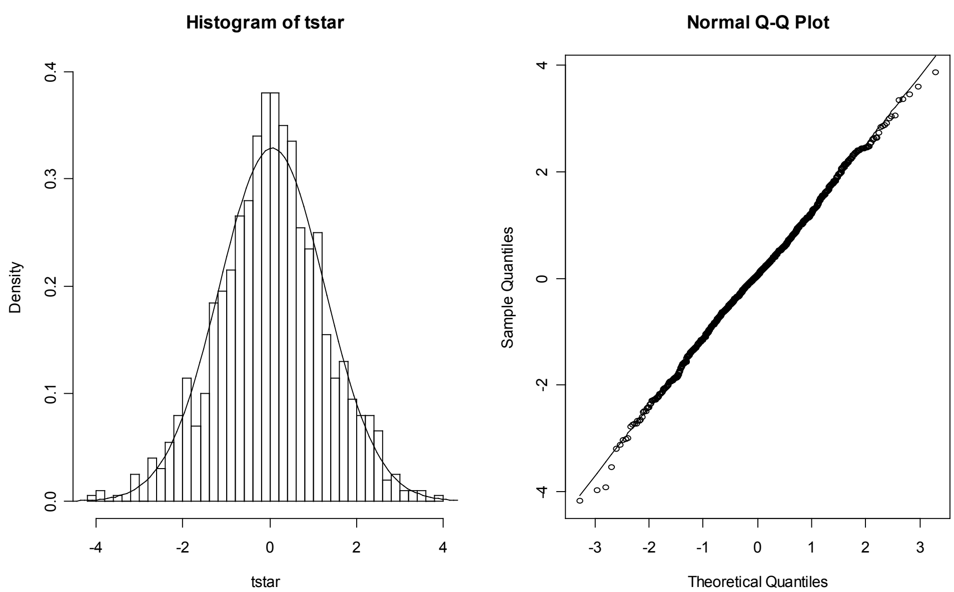
$$FE_{it} = \lambda_0 + \lambda_1 AF + \lambda_2 LGTA + \lambda_3 LAG + \lambda_4 N + \lambda_5 STD$$

	coefficients	std error	t value	p-value
Intercept	-18.8462	16.8335	-1.1200	0.2636
AF	-0.8572	0.6485	-1.3220	0.1870
LGTA	0.3758	0.2225	1.6890	**0.0920**
LAG	0.1781	0.1602	1.1120	0.2669
N	-0.0783	0.0503	-1.5570	0.1203
STD	2.1836	0.6467	3.3770	**0.0008**
Rsquare	0.0428	Adj. Rsquare		0.0312
F-statistic:	3.6700	p-value:		0.0029

FE: Forecast errors, calculated as the absolute value of the difference of the forecasted EPS and reported EPS;
AF: Audit failure, a dummy variable with value 1 indicating audit failure company and value 0 indicating the control company;
LGTA: Natural logarithm of total assets;
LAG: The lag between the forecasts dates and fiscal year end;
N: the number of forecasts;
STD: is the standard deviation of the median analysts' forecasts.

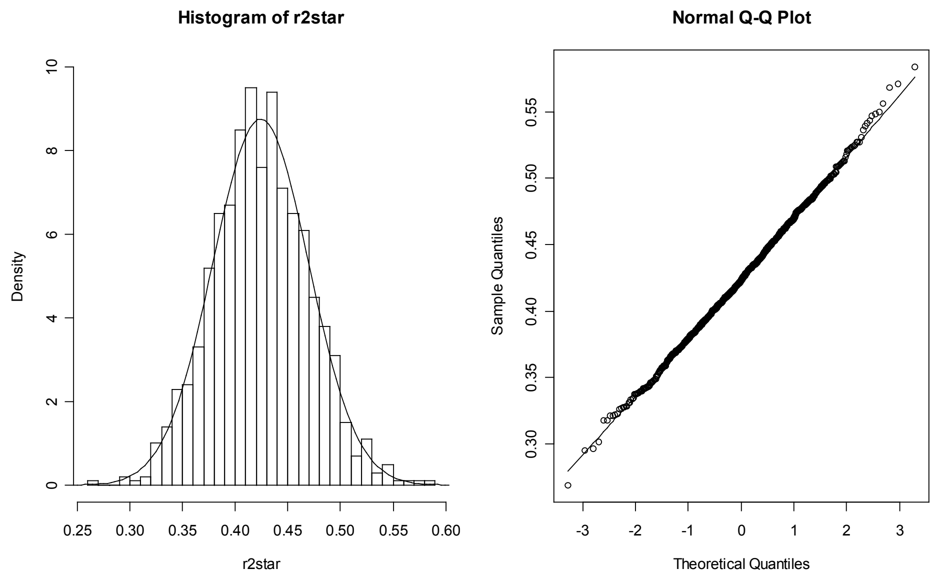


R^{2*}: Audit Failure Group---Both Big Auditors & Non-Big Auditors

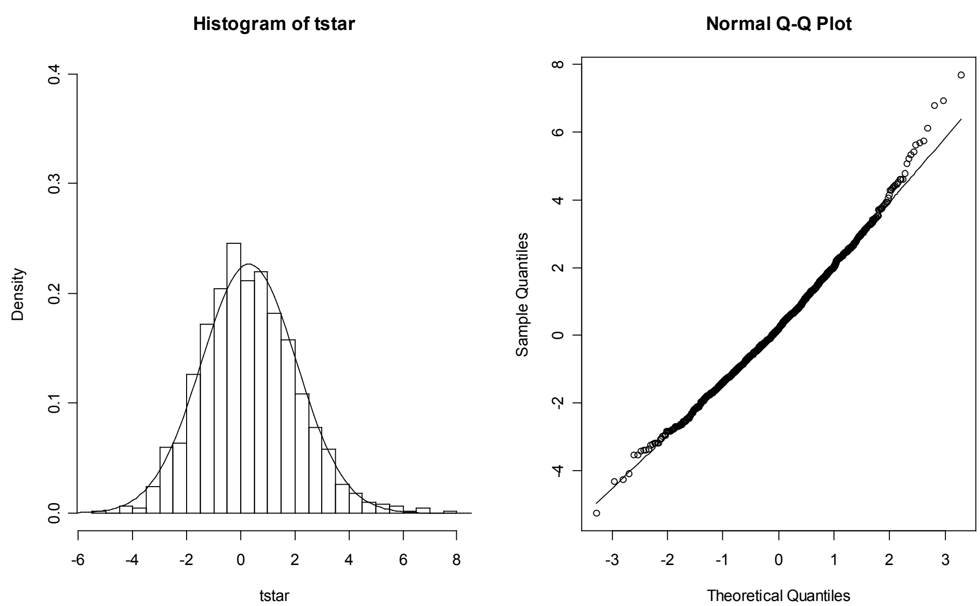


t^{*}: Audit Failure Group---Both Big Auditors & Non-Big Auditors

Figure 1: Histograms and Q-Q Plots for Comparison 1

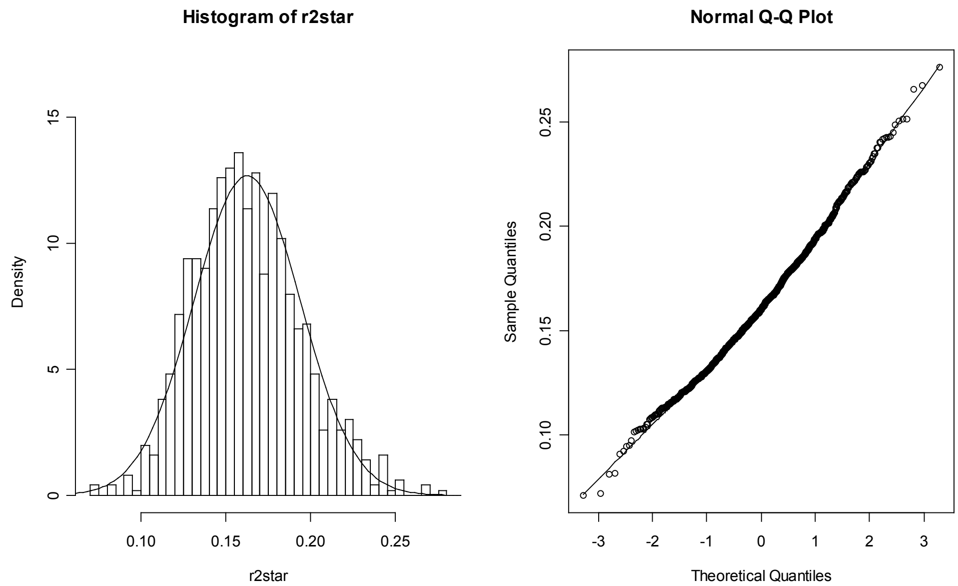


R^{2*}: Matched Control Group---Both Big Auditors and Non-Big Auditors

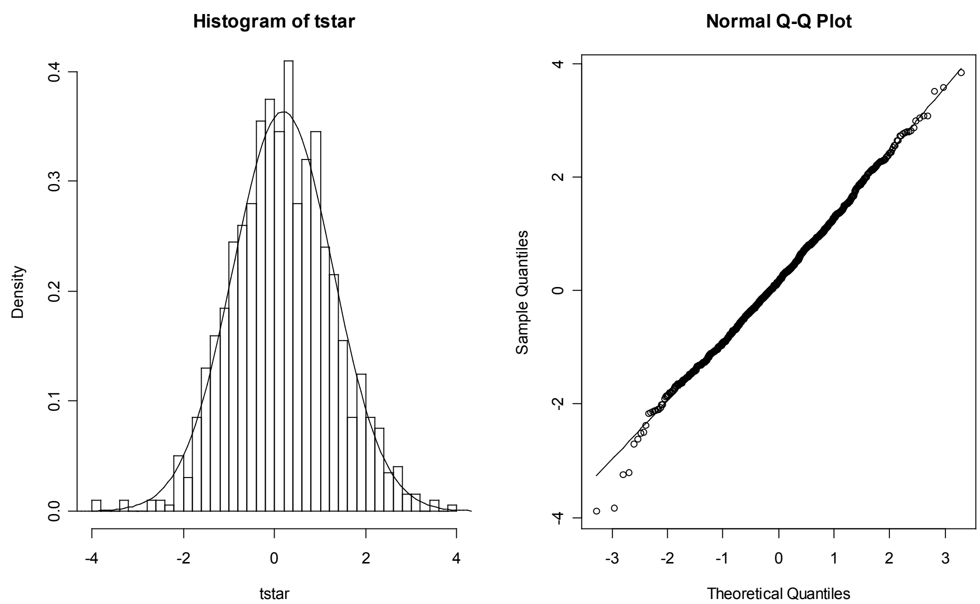


t^{*}: Matched Control Group---Both Big Auditors and Non-Big Auditors

Figure 1 (Continued)

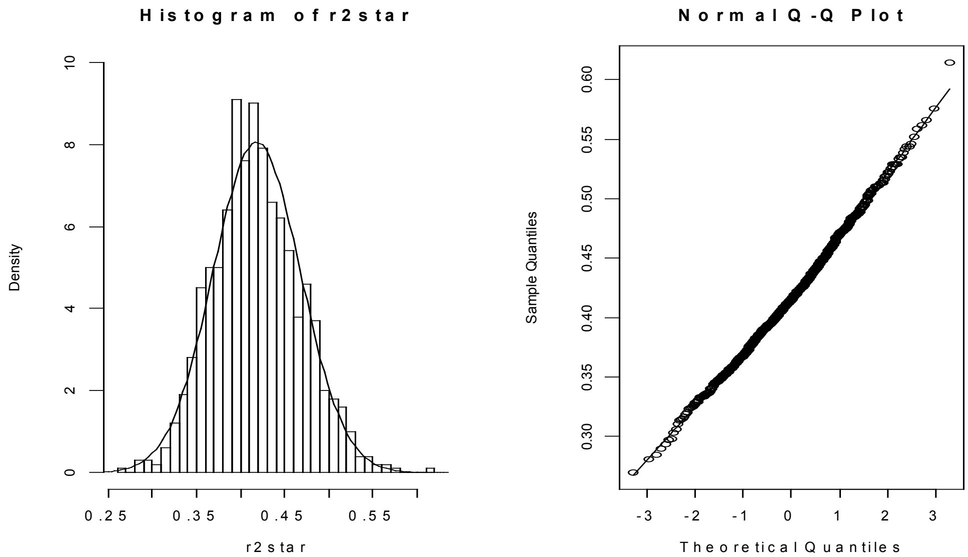


R^{2*}: Audit Failure Group---Big Auditors

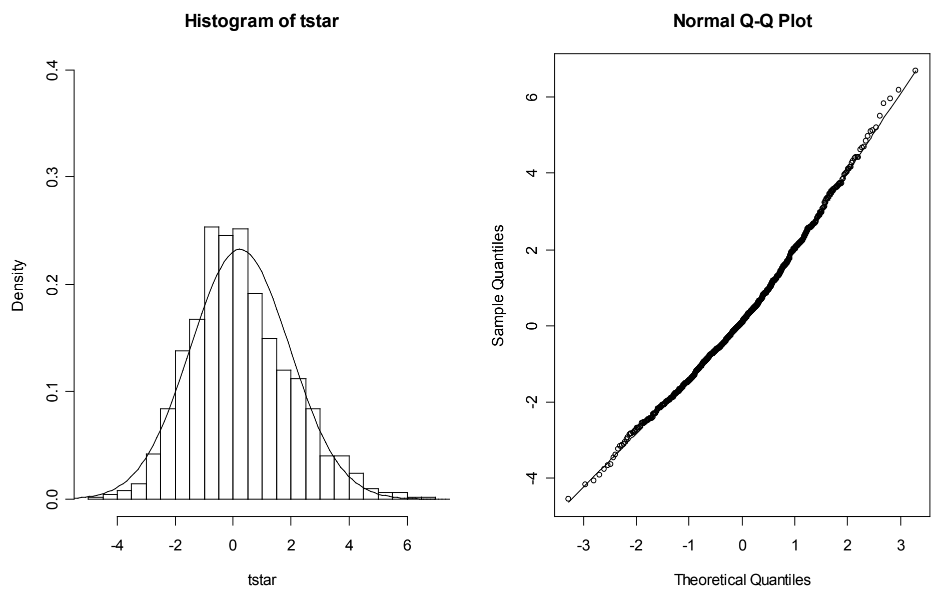


t^*: Audit Failure Group---Big Auditors

Figure 2: Histograms and Q-Q Plots for Comparison 2

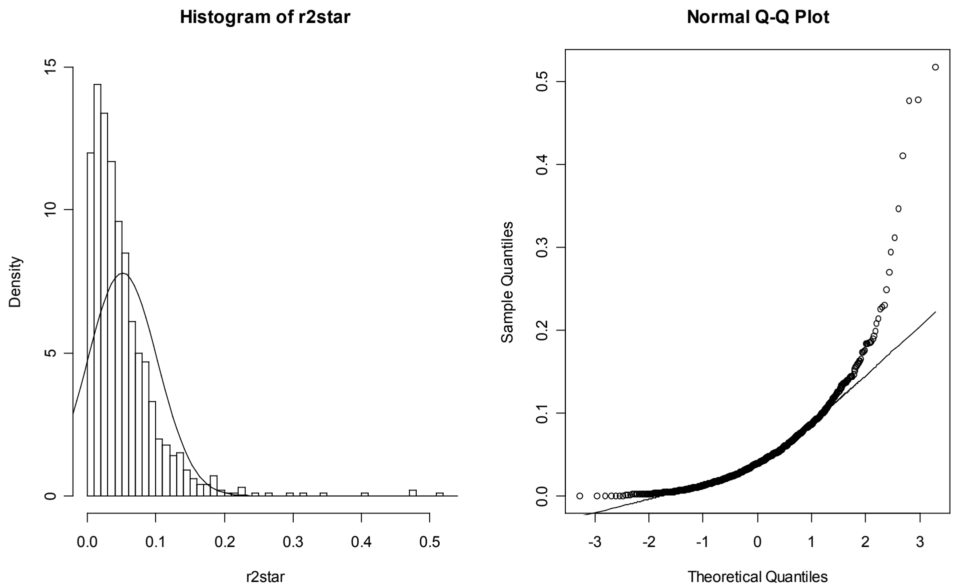


R^{2*}: Matched Control Failure Group-Big Auditors

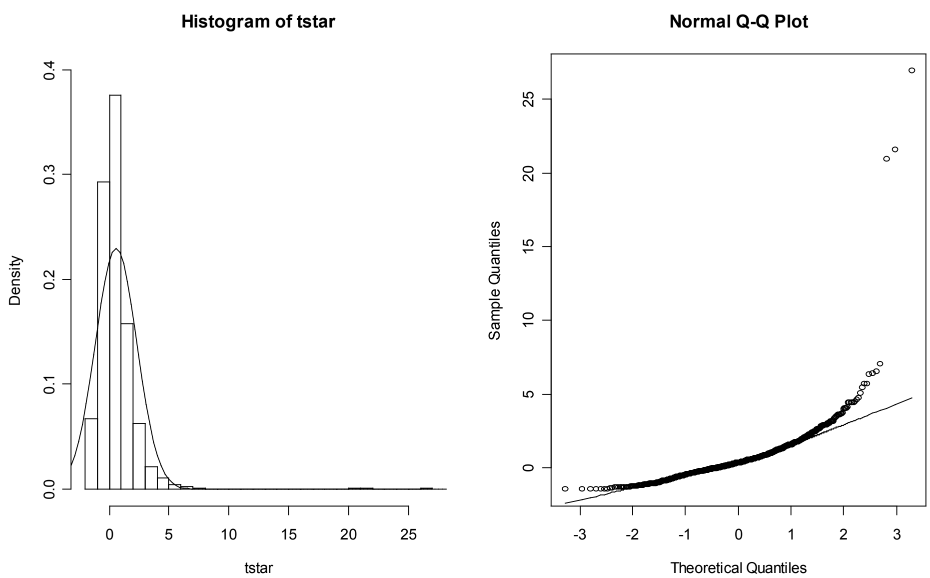


t^*: Matched Control Group-Big Auditors

Figure 2 (Continued)

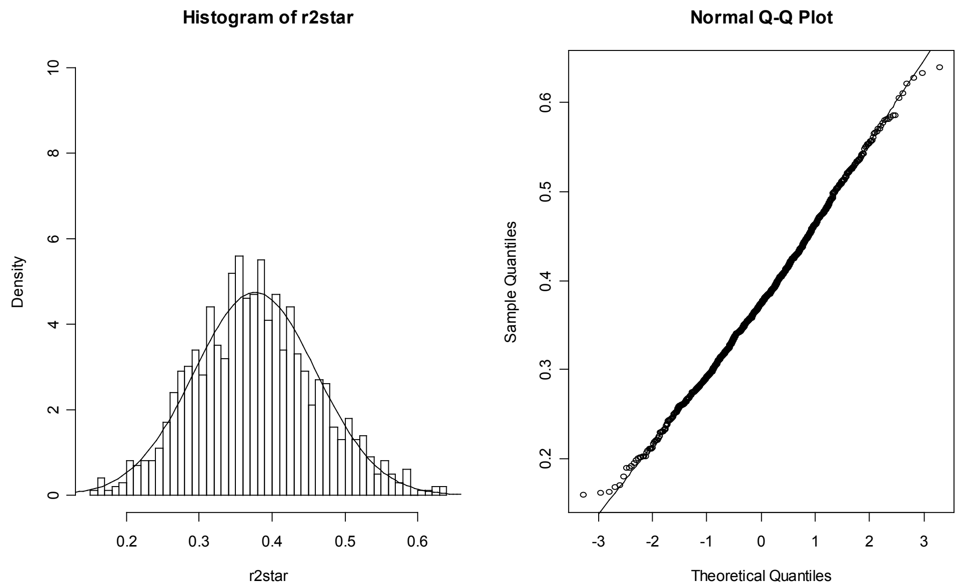


R^{2*}: Audit Failure Group---Non-Big Auditors

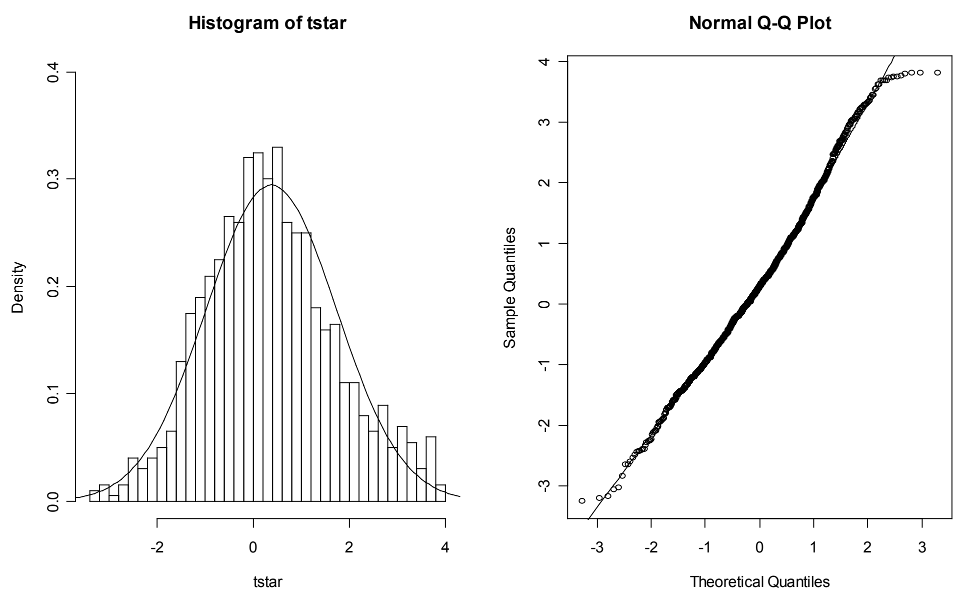


t^2: Audit Failure Group---Non-Big Auditors

Figure 3: Histograms and Q-Q Plots for Comparison 3

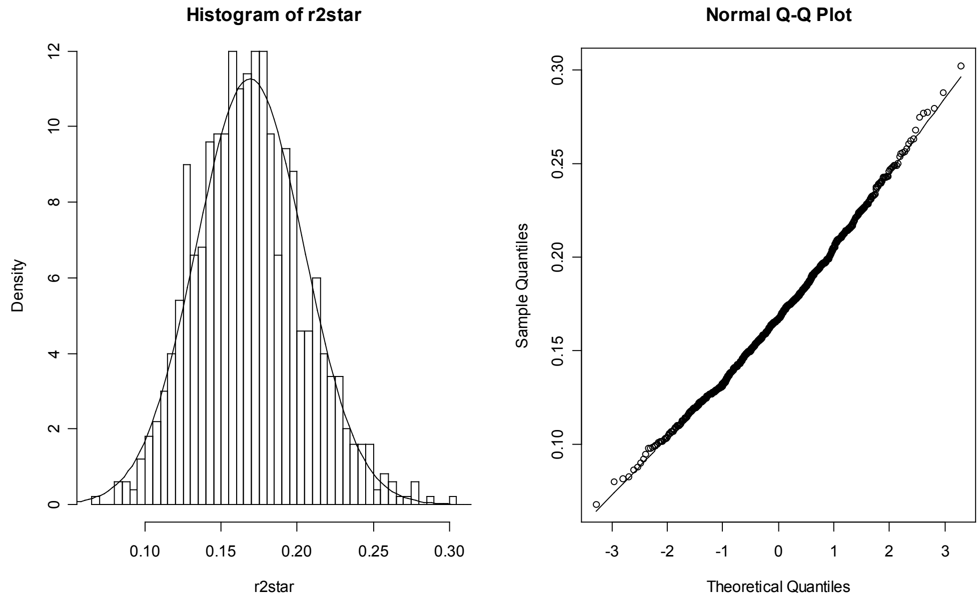


R^{2*}: Matched Control Group---Non-Big Auditors

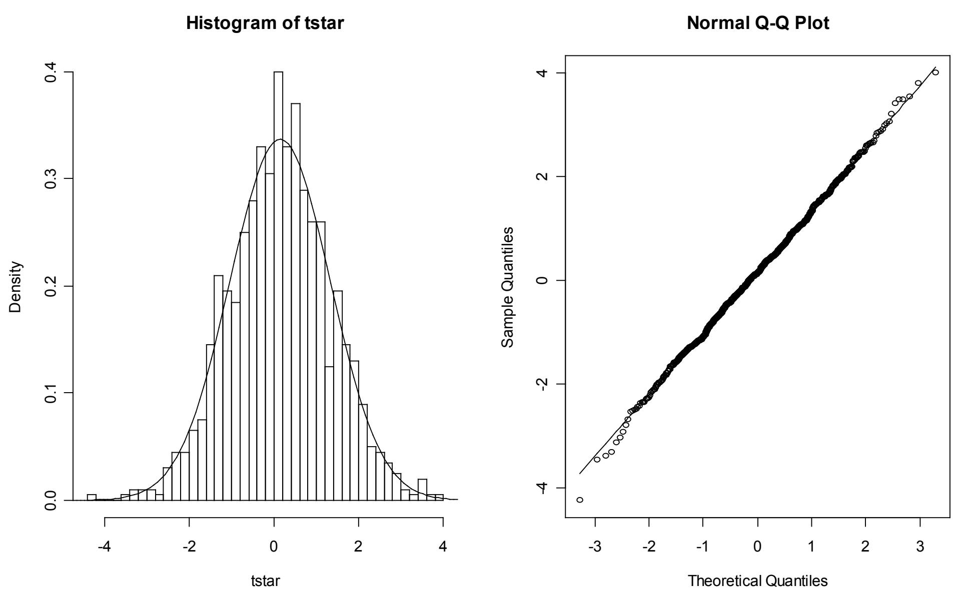


t^2: Matched Control Group---Non-Big Auditors

Figure 3 (Continued)

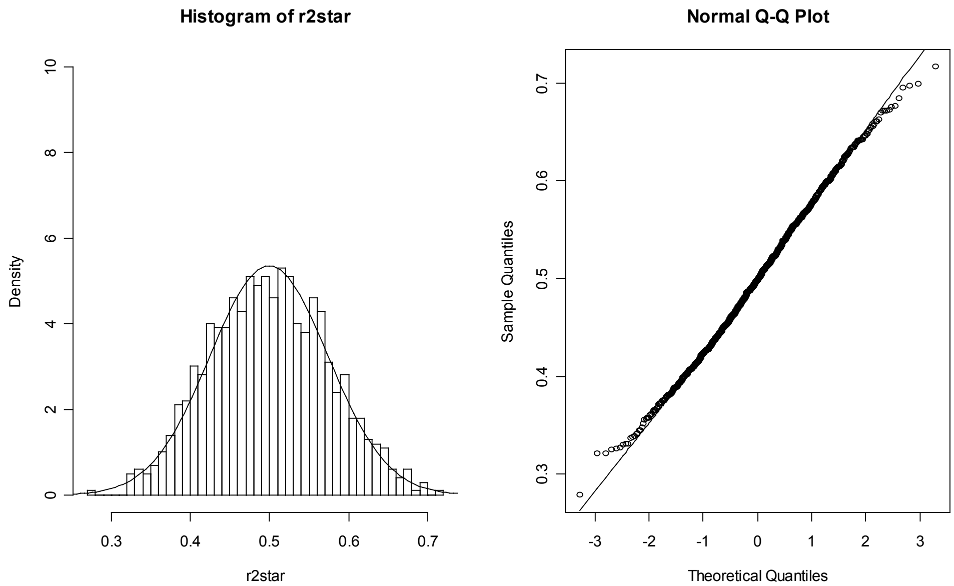


R^2: Audit Failure Group---Big Auditors

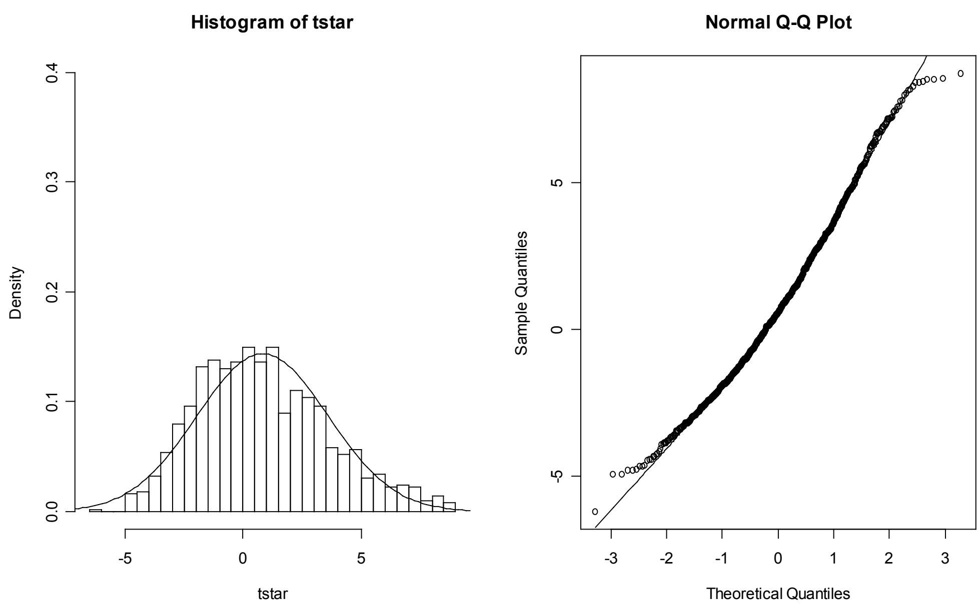


t^*: Audit Failure Group---Big Auditors

Figure 4: Histograms and Q-Q Plots for Comparison 4

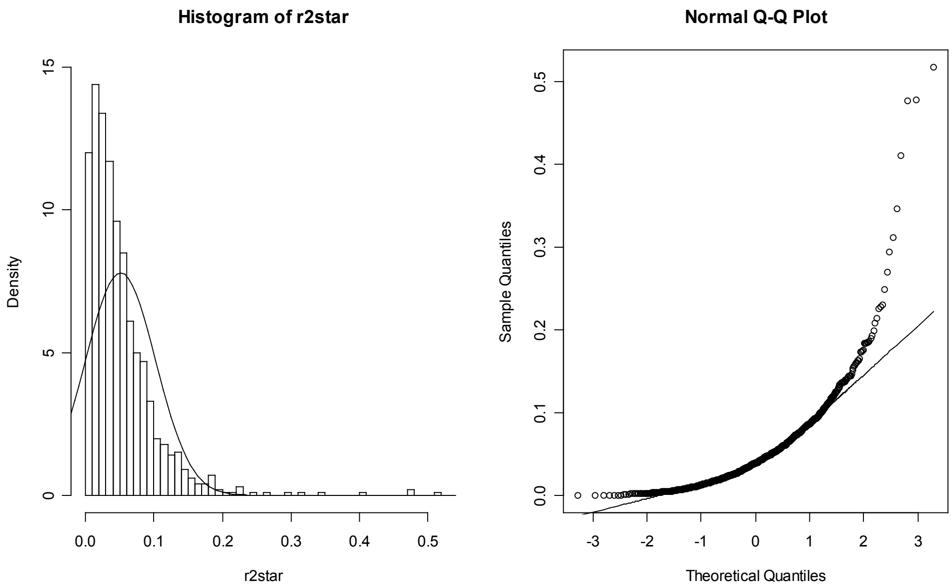


R^{2*}: Matched Control Group---Non-Big Auditors

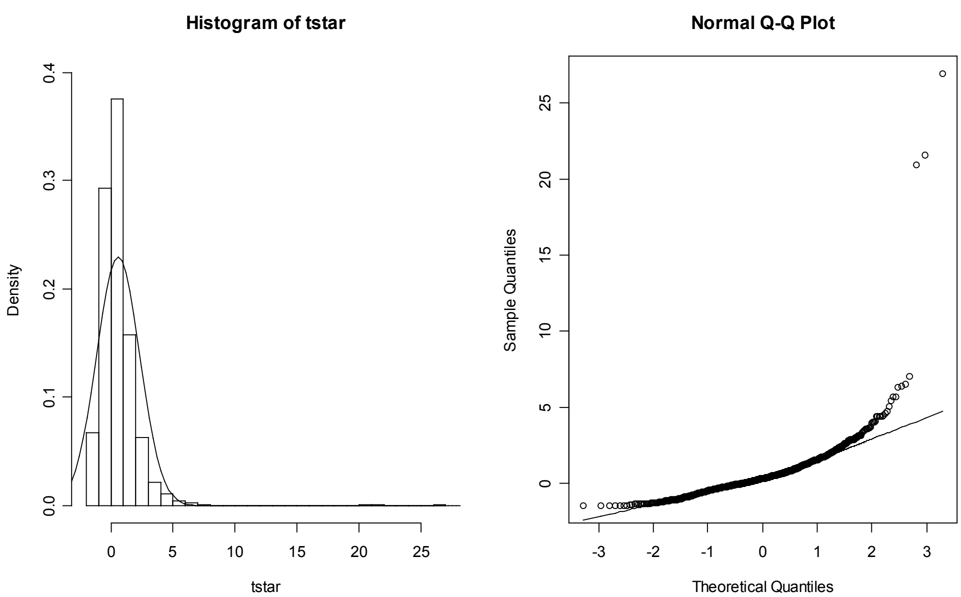


t^*: Matched Control Group---Non-Big Auditors

Figure 4 (Continued)

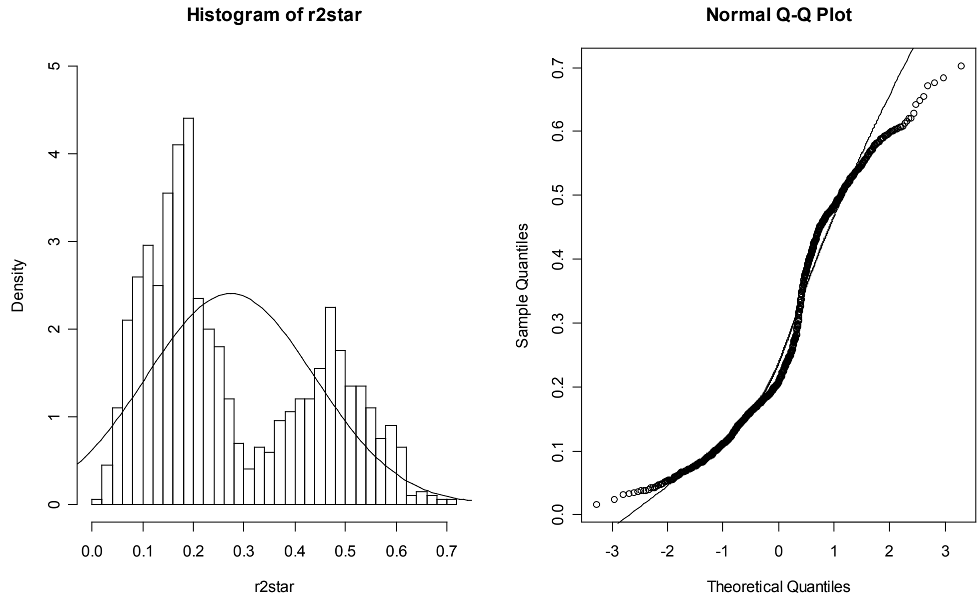


R^{2*}: Audit Failure Group---Non-Big Auditors

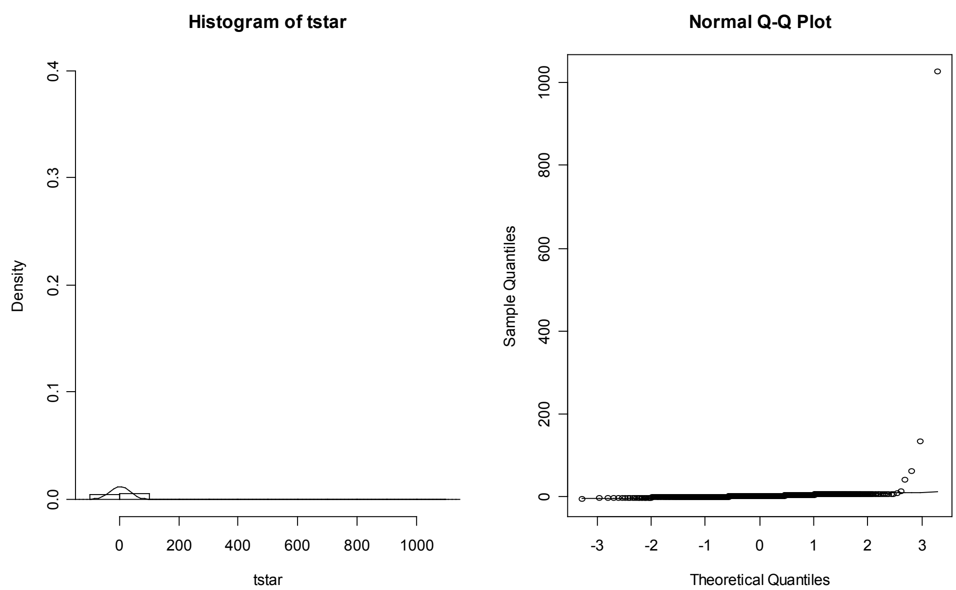


t^*: Audit Failure Group---Non-Big Auditors

Figure 5: Histograms and Q-Q Plots for Comparison 5

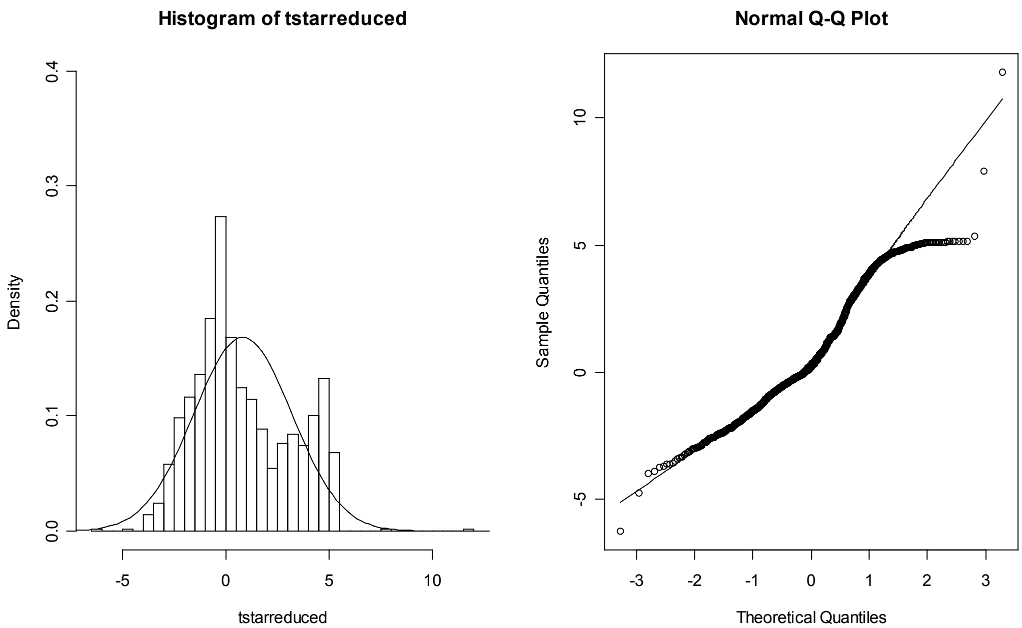


R^{2*}: Matched Control Group---Big Auditors



t^{*}: Matched Control Group---Big Auditors

Figure 5 (Continued)



t^*: Matched Control Group---Big Auditors

After Removing Extreme Values

Figure 5 (Continued)

VITA

Li Dang, Ph.D

Education

Ph.D in Business Administration May 2004

Drexel University, Philadelphia, PA
Primary Area: Accounting; Secondary Area: Quantitative Methods

Master of Management July 1999

Renmin University of China, Beijing, China
Major: Accounting

Bachelor of Economics July 1996

Shaanxi Institute of Finance and Economics
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Research

Working Papers:
"Client Consequences Of Auditor Reputation Loss: An Analysis Of Evidence From The Capital Markets," with Dr. Kevin F. Brown.

This study examines the impact of Anderson's reputation loss on its clients. The results suggest that Anderson clients were penalized due to increased uncertainty about the reliability of their financial reporting after the Enron Scandal.

"The Effect of ERP adoption on the usefulness of accounting information," with Joseph Brazel. Currently in the data collection phase.
This study examines how ERP implementation impacts the reliability and relevance of accounting information.

Professional Experience

Instructor 2000-current
Drexel University, Philadelphia, PA
Research Assistant 1999-2000
Drexel University, Philadelphia, PA