THE EFFECT OF ACCOUNTING REGULATION ON SECOND-TIER AUDIT FIRMS AND THEIR CLIENTS: AUDIT PRICING AND QUALITY, COST OF CAPITAL, AND BACKDATING OF STOCK OPTIONS

A dissertation submitted to the Kent State University Graduate School of Management in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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CHAPTER 1
INTRODUCTION

1.1 Recent Regulatory Changes

The accounting profession has recently been affected by major financial reporting scandals and regulatory changes.¹ Prior to November 2000, the U.S. Securities and Exchange Commission (SEC) did not explicitly address many of the non-audit services auditors were performing. In November 2000, the SEC amended its auditor independence rules and significantly revised the types of non-audit services that auditors could provide to their audit clients. The SEC also required publicly traded firms to disclose fees from two categories of non-audit service: financial information systems design and implementation, and other fees (U.S. SEC 2000). The Sarbanes-Oxley Act of 2002 (SOX) further addressed auditor independence. Specifically, Section 201(a) of SOX expressly prohibits eight types of non-audit services,² as well as any other service that the firms’ board of directors determines that the auditors are not permitted to provide to their public company audit clients. SOX further provides that a registered public accounting firm may engage in non-audit services, including tax services, only if the activity is approved in advance by the audit committee of the board of directors.

¹ Major scandals include the bankruptcy of Enron and WorldCom, the demise of Arthur Andersen, the major stock market crash in 2000, and the most comprehensive securities market reforms since the 1930s.
² The eight specific prohibited services are: (1) bookkeeping or other services related to the accounting records or financial statements of the audit client, (2) financial information system design and implementation, (3) appraisal or valuation services, fairness opinions, or contribution-in-kind reports, (4) actuarial services, (5) internal audit outsourcing services, (6) management function or human resources, (7) broker or dealer, investment advisor, or investment banking services, and (8) legal services and expert services unrelated to the audit.
As mandated by SOX requirements, the SEC, on February 5, 2003, issued a new auditor independence rule, “Strengthening the Commission's Requirements Regarding Auditor Independence.” The SEC 2003 Independence Rules, which generally took effect on May 6, 2003, expressly prohibits the same eight non-audit services specified in SOX. The restriction of tax services was heavily debated by many interested parties when the SEC began drafting these rules. Ultimately, the SEC ruled not to prohibit tax services at that time, but it did caution audit committees to inspect the nature of the tax services that auditors might provide before approving these services. The SEC also required all publicly traded firms to disclose in their annual proxy statement, or other appropriate filing, the audit and non-audit fees paid to the auditor for the two most recent fiscal years and certain other information about non-audit fees classified as audit-related, tax, and all other fees (U.S. SEC 2003).

Accounting research is currently investigating these recent regulatory changes and how they affect the accounting profession. There is a concern for the relationship between independent auditors and their clients in terms of audit quality, audit services, audit fees, and other variables that affect the auditor-client relationship after the implementation of these regulations (e.g., Francis and Wang 2005; Krishnan 2005; Krishnan et al. 2005). Although the entire accounting profession has been affected by these regulations, most accounting research focuses only on Big-audit firms, especially after their concentration, as the major providers of

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3 In this study, Big-audit firms refers to large public accounting firms. These firms differ from other audit firms by their total revenues, size, and global reach. The Big-audit firms were called the Big-8 audit firms in the 1970s and the 1980s. The Big-8 consisted of Arthur Andersen, Arthur Young, Coopers & Lybrand, Ernst & Whinney, Deloitte, Haskins & Sells, Peat Marwick International, Price Waterhouse & Touche Ross. In 1989, Ernst and Whinney merged with Arthur Young to become Ernst and Young and Deloitte, Haskins & Sells merged with Touche Ross to become Deloitte & Touche. From 1989, the Big-audit firms were referred to as the Big-6. Price Waterhouse merged with Coopers & Lybrand in 1998 to become PricewaterhouseCoopers and the Big-6 became the Big-5. Arthur Andersen collapsed after the firm’s indictment for obstruction of justice involving Enron in 2002, and the Big-5 became the Big-4. Peat Marwick International became KPMG. Hence the Big-4 now consists of
high quality audit services. However, there has been very little attention devoted to Second-
Tier (Non-Big) audit firms.\(^4\)

Big-audit firms have been traditionally classified as the provider of higher quality
audits, and previous research provides evidence in such terms (e.g., Blokdijk et al. 2006;
Defond and Francis 2005; Jensen and Payne 2005). Although, in theory, it is assumed that all
accounting firms, whether big or small, can provide a competent audit in accordance with
Generally Accepted Auditing Standards (GAAS), previous research has shown that smaller
audit firms have higher litigation rates, report less conservatively, and have clients that are
more likely to have abnormal accruals. Abnormal accruals provide evidence of more
aggressive earnings management taking place for firms audited by Second-Tier audit firms
(Pittman and Fortin 2004). It is the auditor’s choice whether or not to provide higher quality
audits and there are clients that demand such higher quality audits.

The dominant Big-audit firms audit mostly large publicly-traded U.S. companies (U.S.
GAO 2003). However, there are still a large number of small publicly-traded companies
audited by local and regional accounting firms. There is evidence that Big-audit firms are
eliminating more of their riskier clients, especially post-SOX. As a consequence, these clients
are being engaged by the Second-Tier audit firms (PAR 2005). Given their larger client base,
Big-audit firms have more to lose than Second-Tier audit firms in regards to their loss of
reputation. Therefore, Big-audit firms have greater incentives to protect their reputation than
Second-Tier audit firms (Khurana and Raman 2004).

\(^4\) Some studies refer to audit firms other than the Big-audit firms as “Non-Big audit firms” (e.g., Khurana and Raman 2004; Blokdijk et al. 2006; Fernando et al. 2006; Francis et al. 2005). However, other studies subdivide Non-Big audit firms into Second-Tier audit firms and Small-audit firms (e.g., Tendeloo and Vanstraelen 2005).
Previous accounting research has not fully investigated Second-Tier audit firms and their clients. The objective of this study is to examine the effect of the above-mentioned regulatory changes in the accounting profession on Second-Tier audit firms. Second-Tier audit firms are expected to be influenced by recent accounting scandals and new regulations in terms of their audit fees, audit quality, and their clients’ characteristics, especially after the major accounting scandals.

1.2 Research Questions

The research questions in this study are motivated by agency theory. The agency theory of the firm focuses on the relationship between the principal (stockholders) and the agent (management). The agent has certain obligations, which he fulfills for the principal by virtue of the economic contract (Culpan and Trussel 2005). The important concept in the agency relationship is the selection of the appropriate governance mechanism between the principal and the agent that will ensure an efficient alignment of the principal’s and the agent’s interests. Thus, agency theory would be an appropriate framework to demonstrate and explain the effect of recent regulations on audit firms that serve as the moderator in the principal-agent relationship.

This study addresses four research questions. First, it examines whether clients of Second-Tier audit firms incur higher audit fees subsequent to the recent accounting regulation. Specifically, it determines whether there is an association between the audit market concentration and the price for audit services in Second-Tier firms. Economic theory predicts a positive relationship between auditor concentration and audit fees (Pearson and Trompeter 1994). However, previous research has not investigated empirically the association between audit firm concentration and audit fees of Second-Tier audit firms.
The second research question is whether quality of audits provided by Second-Tier audit firms is expected to change due to rigid regulations and rulings, especially in the post-SOX period. It is also possible that Second-Tier audit firms may not be able to provide high quality audits in their efforts to increase their market share.

Third, this study investigates whether clients of Second-Tier audit firms experience a higher cost of capital compared to clients of Big-audit firms. The cost of capital area of research is substantially related to financial and capital markets research. Client firms that are audited by Second-Tier audit firms are expected to receive lower quality audits compared to client firms that are audited by Big-audit firms. This lower quality audits are reflected in their earnings quality. Previous research employs two approaches for deriving measures of earnings quality. One is based on estimates of abnormal accruals and the other is based on the extent to which working capital accruals map into cash realizations (e.g., Aboody et al. 2005; Francis et al. 2005). Lower quality accruals are associated with larger costs of debt and equity due to the information risk (Francis et al. 2005). This study examines the relationship between client firms that hired Second-Tier audit firms and the cost of debt and equity for these firms. Engaging a Big-audit firm, which has the reputation for supplying a higher quality audit that enhances the credibility of the financial statements, enables firms to reduce their financing costs (Pittman and Fortin 2004). In contrast, this study predicts that firms that are audited by Second-Tier audit firms are subject to larger financing costs measured by higher costs of debt and equity. Although prior research examines the role of auditor choice on the cost of capital and the cost of debt for public firms, there is no evidence on the effect of audit quality of Big-audit firms and Second-Tier audit firms on the cost of capital of their clients, especially in the post-SOX period.
The final research question addresses whether there is a relationship between clients of Second-Tier audit firms and the backdating of executive stock options (ESOs). It is expected that clients of Second-Tier audit firms exercise backdating of ESOs more often than clients of Big-audit firms. Backdating of ESOs is only one form of dating games that executives play. Backdating involves the executive designating the grant date at a date before the board makes the decision to grant options. This is done to obtain options at a lower exercise price since the exercise price is usually set equal to the stock price prevailing on the designated grant date. It is worthwhile to backdate only if the stock price has been rising in the days before the board decision date (Narayanan et al. 2006). This study develops a test that relates stock cumulative abnormal returns (CAR) patterns around the grant date for clients of Second-Tier audit firms in comparison to CAR patterns for clients of Big-audit firms. This test helps in detecting the backdating of ESOs. If executives are backdating options, a longer reporting lag implies that, on average, they were backdating aggressively, seeking a lower exercise price. This suggests that stock price increases following the manager-designated grant date will be positively correlated with the reporting lag. It is expected that auditor can help in reducing these backdating practices. Since Big-audit firms are characterized as providers of high quality audits, it is expected that they are capable of preventing exercises of backdating of ESOs more efficiently than Second-Tier audit firm.

1.3 Research Hypotheses and Expectations

Four sets of hypotheses are developed to investigate the research questions in this study. The first hypothesis asserts that audit fees paid to Second-Tier audit firms are higher in the post-2002 period (post-SOX) when compared to the pre-2002 period (pre-SOX). The second set of hypotheses emphasizes that audit quality provided by Second-Tier audit firms is
less than audit quality provided by Big-audit firms in the post-2002 period, and that audit quality provided by Second-Tier audit firms declined in the post-2002 period. The third set of hypotheses covers the cost of capital issues and states that cost of debt for clients of Second-Tier audit firms is higher than cost of debt for clients of Big-audit firms. Similarly, the cost of equity for clients of Second-Tier audit firms is higher than cost of equity for Big-audit firms’ clients. In respect to the backdating of ESOs issue, the fourth hypothesis states that clients of Second-Tier audit firms exercise backdating of ESOs more frequently than clients of Big-audit firms.

The approach taken to test the difference between pre- and post-SOX audit fees paid to Second-Tier audit firms is based on a regression model that regresses audit fees on an indicator variable that differentiates between the two periods and a set of control variables that are considered the determinants of audit fees throughout the audit fees literature. To measure audit quality, a model that is based on the modified Dechow and Dichev’s (2002) model of accruals quality is used. The standard deviation of the unexplained portion of the variation in total current accruals is an inverse measure of accruals quality, where a greater unexplained portion implies poorer quality. The audit quality measure is then regressed on an indicator variable and a set of control variables in order to compare the audit quality of Big-audit firms and Second-Tier audit firms in the post-Sox period and to test the audit quality changes, both pre- and post-SOX.

To test the relationship between cost of capital and auditor size, the cost of capital measures, separated into cost of debt and cost of equity, are regressed on an indicator variable scheme representing the auditor size and a set of control variables. The approach to be used to

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5 Four different methods of generating cost of equity are used in this study. These methods follow Easton (2004), Gode and Mohanram (2003), Gebhardt et al. (2001), and Claus and Thomas (2001).
examine the relationship between auditor size and the cost of capital is based on the approach of measuring the cost of capital used in Easton (2004) and Khurana and Raman (2004).

In the last section of the study, cumulative abnormal security returns measures are used as indicators of backdating of ESOs. Two groups of data are employed in developing the backdating of ESOs test: firms that are audited by Second-Tier audit firms and a control group of firms audited by Big-audit firms.

1.4. Summary of Results

Results of the first part of this study based on the two non-parametric tests, the Binomial test and the Wilcoxon signed-rank test, show that the number of client firms audited by Second-Tier audit firms reporting an increase in audit fees is significantly higher than the number of firms reporting a decrease. The audit pricing model regression results confirm the results of the non-parametric tests. Results show that audit fees values have increased for clients of Second-Tier audit firms as well as for clients for Big-audit firms in the post-SOX period. These findings are consistent with the hypothesis that audit fees paid by clients of Second-Tier audit firms are higher in the post-2002 period compared to the pre-2002 period. However, these findings show that the amount of increase in audit fees paid by clients of Second-Tier audit firms is not as high as the amount of increase in audit fees paid by clients of Big-audit firms.

Results of the second part of this study, which address the quality of audits provided by Second-Tier audit firms and present the relationship between audit quality and audit fees, indicate that audit quality provided by Big-audit firms to their clients is higher than the audit quality provided by Second-Tier audit firms. However, the audit quality provided to clients of Second-Tier audit firms did not change in the post-SOX period. One possible explanation to
this finding is that the quality of audits provided by Second-Tier audit firms has not changed significantly in the post-SOX period because Second-Tier audit firms need to sustain the level of audit quality in an effort to increase their market share. The study also shows that there is a negative association between audit fees and the audit quality provided by audit firms. This could be explained as audit fees are generally higher for more complex types of client firms. Due to their clients’ complexity, audit firms fail to provide high audit quality for their audit services, even though they have to charge higher audit fees.

The third part investigates whether clients of Second-Tier audit firms experience a higher cost of capital compared to clients of Big-audit firms. Audit quality has an effect on investors’ perception of information risk. Firms with more information risk will have higher costs of capital, where the information risk concerns the uncertainty of information used or desired by investors to price the expected cost of capital. The cost of capital for clients of Second-Tier audit firms is compared to the cost of capital of Big-audit firms in terms of the expected effect of the level of audit quality provided on the cost of capital. The cost of capital is split into two components: one component is the cost of debt, and the second component is the cost of equity. The results show that clients of Second-Tier audit firms incur cost of debt that is higher than the cost of debt incurred by clients of Big-audit firms. However, clients of Second-Tier audit firms do not experience significant higher cost of equity when compared to clients of Big-audit firms. Four approaches for cost of equity calculation are used in the study to proxy for four different ways of calculating the implied cost of capital. The results of these four measures fail to support the hypothesis that cost of equity for clients of Second-Tier audit firms is higher than the cost of equity for clients of Big-audit firms. On the other hand, audit quality is positive and significant with three of the four measures of cost of equity, which suggests that audit quality is associated with the cost of equity.
The results of the last part of this study, which investigates whether there is a relationship between clients of Second-Tier audit firms and the backdating of ESOs, present the return trends around ESOs grant dates for clients of Second-Tier audit firms. The results show that return trends around ESOs grant dates for clients of Big-audit firms are more pronounced than for clients of Second-Tier audit firms during the sample period. However, these return trends cannot be observed in the Post-SOX period. This finding provides important evidence on the impact of new regulations on mitigating executive opportunistic behavior associated with ESO grants for clients of Second-Tier audit firms.

1.5. Research Contribution

This study enhances our understanding of previous audit and financial accounting research from the perspective of Second-Tier audit firms. By examining Second-Tier audit firms and their clients, a better understanding of why some firms are more or less likely to hire a Big-audit firm versus a Second-Tier audit firm is developed. This study should be of interest to the investment public because understanding the selection of an audit firm is important for at least three reasons. First, it is known that companies raising capital from outside investors use independent audit firms to reduce the risk associated with investment. Audit firms increase the information available to investors and thereby reduce the risk of a given investment. Second, audit quality differences among audit firms are derived from their financial market effects. Accordingly, with higher quality audits, companies should have a lower cost of capital than similar companies with lower quality audits. Finally, this study should help investors and regulators understand the issues raised by backdating of ESOs, and whether the quality of the audit provided would be able to mitigate such irregular behavior.
1.6. Summary

This chapter presents the sequence of regulatory changes in the accounting profession due to major financial reporting scandals. SOX made changes to several auditor-client engagement-specific characteristics with the ultimate aim of improving auditor independence. Accounting research focuses on how these recent changes have affected the accounting profession, and more specifically, the relationship between independent auditors and their clients in terms of audit quality, audit services, audit fees, and other variables that constitute the relationship between the auditor and the client. This study specifically examines the effect of the recent changes in the accounting profession on Second-Tier audit firms in terms of their audit fees, audit quality, and their clients’ characteristics.

Four research questions are addressed. First, this study addresses whether clients of Second-Tier audit firms incur higher audit fees subsequent to the recent accounting regulation, and whether there is an association between the audit market concentration and the price for audit services in Second-Tier firms. Second, this study examines whether quality of audits provided by Second-Tier audit firms has declined and is lower than Big-audit firms in the period subsequent to the recent accounting regulation. Third, the cost of capital for clients of Second-Tier audit firms in comparison to clients of Big-audit firms is investigated. Finally, the question of whether there is a relationship between clients of Second-Tier audit firm and backdating of ESOs is addressed.

The findings of this dissertation contribute to our understanding of the previous audit and financial accounting research from the perspective of Second-Tier audit firms. By examining Second-Tier audit firms and their clients, we have better understanding of why some firms are more or less likely to hire a Big-audit firm versus a Second-Tier audit firm.
The remainder of this study is organized in four chapters. Chapter 2 reviews the relevant literature. Chapter 3 discusses the hypotheses and addresses the research methodology, including the sample selection process, data sources, regression models, and definition of variables. In Chapter 4, the results and explanations of the results are introduced. Finally, Chapter 5 provides conclusions and a summary of the study in addition to limitations and recommendations for future research.
CHAPTER 2
BACKGROUND AND LITERATURE REVIEW

2.1 Agency Theory and the Audit Profession

Agency theory has originated with an emphasis on voluntary contracts that arise among various organizational parties as the efficient solution to the conflicts of interests. The theory has evolved to view firms as a “nexus of contracts.” Given this “nexus of contracts” perspective of the firm, the related contracting cost theory views the role of accounting information as the monitoring and the enforcing mechanism of these contracts. The firm’s choice of accounting method is viewed as being embedded in the overall choice problem of maximizing share price, subject to investment and financial opportunities. Management is assumed to face an opportunity set of vectors of investment, financing, and accounting methods possibilities and to select a combination of an investment and financing mix in order to maximize shareholder wealth (Belkaoui 1985).

Watts and Zimmerman (1978) present evidence that auditing has not been developed as a result of governmental requirements, but rather for purposes of reducing the agency costs and conflicts of interest among parties to the firm. According to agency theory, the agent (management) fulfills certain obligations for the principle (shareholders) by virtue of the terms of the economic contract. The primary means of monitoring managers of a firm is by an audit of the financial statements by an independent monitor (audit firm). In order for this monitoring mechanism to be successful, several components of the audit must be in place. First, the monitor must be independent of the agent, meaning that the auditors must not have any conflicts of interest with the managers. Second, the standards for conducting the audit must
provide reasonable certainty of detecting misstatements or fraud. Finally, the agent’s accounting practices and financial disclosures must be relevant and reliable (Culpan and Trussel 2005).

Based on this framework, auditing dilutes the adverse effects of the separation of ownership and control (Jensen and Meckling 1976). However, some of the main features of the audit environment, such as competition and regulations, interfere in the role of separation of ownership and control. Competition from the marketplace limits the rents an audit firm receives from its private information. Yet, the market also provides the audit firm with alternative sources of demand that increase its threats of resignation. Regulations create the requirement for the purchase of a minimum quantity of auditing, as suggested by Generally Accepted Auditing Standards that prescribe minimum audit procedures (Antle and Demski 1991). Therefore, competition and regulation may interact in determining the relationship between an audit firm and its role in diluting the adverse effects of the separation of ownership and control.

Puro (1984) provided empirical results on auditor lobbying behavior when new standards were being considered by the Financial Accounting Standard Board (FASB). She presented an alternative model of lobbying behavior based on agency theory. The auditor’s role represented as an agent and the stockholders of clients firms are their principals. Auditors are expected to lobby for rules which benefit their clients and, in the process, benefit the audit firms. Under the assumption that a perfect agency relationship does not allow for the possibility that changes in accounting rules can move audit firms away from their clients’ interest as they pursue their own, Puro (1984) found that there is a classic agency problem when an accounting rule promises more business to audit firms. This accounting rule will
compensate auditors for losses suffered when their clients’ wealth decreases due to the new rules.

According to Jensen and Meckling (1976), one component of the agency costs is monitoring costs incurred by shareholders to monitor managers’ actions. Nikkinen and Sahlström (2004) showed that agency theory provides a general framework for audit pricing. Therefore, audit fees are determined by agency theory and a set of other factors. Audit fees are an important part of monitoring costs, since auditors have a duty to ensure that the managers are behaving according to the owners’ interests while they also have a duty to inspect the company’s accounts. Based on this finding, auditors use more time to inspect managers’ activities when the agency problem is greater.

2.2 **Supplier Concentration in the Market for Audit Services**

The number of public accounting firms widely considered capable of providing audit services to large national and multinational public companies has decreased from eight (Big-8) in the 1980s to four (Big-4) as of present. These four firms currently audit over 78 percent of all U.S. public companies and 99 percent of public companies annual sales. The Big-4 also dominate the market for audit services internationally. There is a wide-held concern that there are only a few large audit firms capable of auditing large public companies, which raises potential choice, price, quality, and concentration risk concerns (U.S. GAO 2003). However, while concentration measures are a good indicator of market structure, the link with competitiveness is more complex than often assumed. The theory of industrial organization\(^6\)

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\(^6\) Industrial organization theory presumes that market structure (i.e. the numbers of competing firms and their market shares) is a causal determinant of market conduct (i.e. the extent and nature of price and non-price competition). Market conduct, in turn, determines economic performance, in particular, whether or not excess profits are earned through oligopoly or the exercise of monopoly power.
does not make a clear statement regarding the impact of concentration on competition (Beattie et al. 2003).

Changes in market concentration occur for three main reasons: voluntary realignments, changes in the set of consumers, and changes in the set of suppliers. Realignments take place for a variety of reasons. The six most common reasons suggested by Beattie et al. (2003) are: high audit fees, dissatisfaction with audit quality (in terms of the auditor’s ability to detect problems), changes in company’s top management, need for group auditor rationalization; need for a Big-audit firm, and merger with or takeover by another company. If, however, there is an underlying preference for the leading suppliers, then these realignments will gradually result in rising concentration. Major increases in concentration can occur when leading suppliers disappear from the market, either through merger or collapse.

The concentration issue has been the concern of accounting research since the early 1960’s. Mautz and Sharaf (1961) observed that significant concentration was taking place in the American auditing profession in the late 1950s and early 1960s. They predicted that this trend would result in a few very large firms and many very small firms, with little in between. Gilling and Stanton (1978) noted that Mautz and Sharaf’s (1961) prediction applied internationally in those audits of large public Australian companies that were dominated by a few very large international public accounting firms.

In the of mid 1970’s, a U.S. Senate Subcommittee examined the level of competition among external auditors and published a staff report that argued that, if a limited number of suppliers controlled the market for audit services, then they could elude the competitive pricing mechanism by acting as a de facto cartel. The committee claimed that the Big-audit firms, in effect, had created such a cartel by using their dominance in the American Institute of Certified
Public Accountants (AICPA) to set professional policies and sanction anticompetitive practices (U.S. Congress 1977).

Danos and Eichenseher (1982, 1986) and Eichenseher and Danos (1981) investigated seller concentration in the market for audit services. Examining auditor concentration ratios by industry over time, for both regulated and unregulated industries, they found that concentration ratios were higher for regulated industries than for unregulated industries, and that concentration declined over time for unregulated industries, but remained high for regulated industries. Further analyses suggest an increase in competition among the Big-audit firms for clients in unregulated industries. Thus, for clients in unregulated industries, it is unclear whether analyses based on structural theory are appropriate because it does not account for the possibility of increasing competition among the dominant suppliers of audit services. However, for clients in the regulated industries, the results appear to be clear-cut (Pearson and Trompeter 1994). Danos and Eichenseher (1982, 1986) and Eichenseher and Danos (1981) conclude that economies of scale have allowed a limited number of auditors to dominate the market for audit services in regulated industries. They attribute these economies of scale to the development of expertise in handling complex regulatory matters. The resulting control of the market by a few firms is consistent with a lack of competition in the market for audit services within regulated industries.

The mergers between large public accounting firms in the late 1980s reduced the Big-8 firms to the Big-6 firms, resulting in increased concentration of auditing services around the world. Pearson and Trompeter (1994) relaxed Danos and Eichenseher’s restrictive assumptions.

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7 Two measures of auditor concentration are commonly used. These are the concentration ratio and the Hirschman-Herfindahl Index (HHI). The concentration ratio is the percentage of total sector size accounted for by the largest \( n \) audit firms. Sector size is calculated using both the number of clients within an industry sector, and the proportion of that sector's audit fees earned by the largest \( n \) audit firms. The HHI is calculated by summing the squared individual market shares of all accounting firms.
of audit homogeneity, allowing for the possibility of high concentration levels even if high market share auditors were not the lowest suppliers. They relaxed these assumptions based on prior research that presented evidence that the auditor’s reputation has value and that capital markets do not view all audits equally (Balvers et al. 1988; Beatty 1989; Menon and Williams 1991). This evidence have been further supported by audit pricing studies (e.g., Francis 1984; Palmrose 1986; Francis and Simon 1987), which showed evidence of a fee premium charged by Big-audit firms.

Pearson and Trompeter (1994) find that audit fees are negatively related to industry concentration. This finding is inconsistent with structural theory, which predicts that high concentration will be associated with reduced price competition. Additionally, they find that market leaders engage in significant fee cutting when bidding for each other’s clients. In combination, these two findings suggest that concentration measures may not be appropriate metrics for the assessment of price competition since they do not account for the possibility of intense competition for clients among the market leaders.

Minyard and Tabor (1991) was one of the first few studies to investigate the effect of mergers of the Big-8 audit firms on auditor concentration. They find that the mergers of the Big-8 audit firms have little, if any, influence on competition within the market structure for auditing services provided by large firms. Opposing results were suggested by Tonge and Wootton (1991). They examined the independent auditor concentration and competitiveness that occurred as a result of mergers within the Big-8 firms. They find that mergers do not necessarily result in less competition and higher prices. This was the case with the Big-8 mergers. By merging, the smaller Big-8 firms became more competitive with the larger firms. Although there are fewer major competitors, the remaining firms should be more comparable in
size, market share, and available resources. Therefore, these mergers produce more competition among the major accounting firms.

The continuing trend toward a few large suppliers of auditing services has received increased notice by the international business community and has raised concerns among regulatory agencies worldwide of the impact of mergers on competition, audit fees, auditor independence and audit quality. Walker and Johnson (1996) reached the following conclusions about the international business community. First, non-U.S. audit markets are becoming increasingly dominated by the large international firms and their affiliates. Second, studies of audit quality are limited and report conflicting findings as to whether large audit firms provide a higher quality product. Finally, there is evidence that these firms receive a fee premium for their services in most countries, consistent with a theory of quality-differentiated services. However, environmental factors in countries such as New Zealand, Malaysia, and Korea affect the competition for audit services.

Thavapalan et al. (2002) examined the impact of the Price Waterhouse, and Coopers and Lybrand merger on audit firm concentration in the Australian market. They examined the effect of the merger on audit firm competition using both the pre- and post-merger date. Their study showed that concentration, measured by the percentage of clients and audit fees for the Big-audit firms, has increased. However, they demonstrated that looking at this measure in isolation to determine the effect of the merger on competition is insufficient. When this ratio is combined with an approach that considers the distribution of the market share between the Big-audit firms, the effect of the merger on concentration becomes less clear. Using the Hirschman-Herfindahl Index, they observed that in a number of industries, auditor concentration has decreased. Therefore, they suggest that when mergers are evaluated, it is important to consider more than one measure of concentration. When calculating the market
share captured by dominant suppliers, it is important to also consider the impact on the distribution of clients among the dominant suppliers. In terms of the audit market, they suggested that future mergers among the Big-audit firms (Big-5 at that time) should not automatically be ruled out. For example, if a merger takes place between two of the smaller Big-5, allowing them to achieve critical market share in a number of industries and compete with the biggest firms, then such mergers may actually lead to increased competition.

Recently, in 2002, a reduction in the number of Big-audit firms occurred because of the accounting and auditing scandals associated with Enron and WorldCom. Their auditor, Arthur Andersen, suffered a large scale reputation loss that the firm was unable to continue. This event introduced a shock to the system, destabilizing the established market equilibrium. Beattie et al. (2003) predicted that the consequence of this and other recent accounting scandals is a marked reduction in audit fee pressures. Companies are no longer requesting low fees, recognizing the need for high quality audits to restore confidence in audited accounts. After a long period of stability and a decline in the level of real audit fees in the United States and worldwide, a widespread change in audit fees appears to be occurring. For example, Beattie et al. (2003) showed that the United Kingdom audit market situation is not as clear as the United States, as the incidence of audit tendering is increasing and there are no regulatory driven requirements for additional work in relationship to corporate governance.

2.3 Audit Quality

Audit quality is defined as the probability that the auditor will both detect and report a breach in the contract in order to provide fair accounting information (DeAngelo 1981). Audit
quality is a variable that is difficult to observe and is difficult to measure objectively,\(^8\) which makes it an unobservable variable (Jensen and Payne 2005). Several studies have found other measures that are highly correlated with measures of audit quality. These studies identify abnormal accruals (e.g., Krishnan et al. 2007; Carey and Simnett 2006; Hoitash et al. 2005), Earnings Response Coefficients (ERCs) from contemporaneous returns-earnings regressions (e.g., Kumar and Lim 2007; Ghosh and Moon 2005), beating or missing earnings benchmarks (e.g., Carey and Simnett 2006), industry expertise level (e.g., Jensen and Payne 2005), audit tenure (e.g., Beck and Wu 2006; Ghosh and Moon 2005), and auditor’s reputation (e.g., Hay and Davis 2004) as reasonable proxies for certain aspects of audit quality.

Abnormal accruals provide a metric for assessing the degree of bias infused into the financial statements by management and tolerated by the auditor (Hay and Davis 2004). Abnormal accruals have been used in many studies to proxy for independence violations and audit quality (e.g., Krishnan et al. 2007; Carey and Simnett 2006; Hoitash et al. 2005; Chung and Kallapur 2003; Frankel et al. 2002). Some studies employ tests using directional abnormal accruals measures (either income-increasing or income-decreasing) and other studies employ tests using the absolute value of abnormal accruals. Dechow et al. (1995) and Kothari et al. (2005) showed that there is a correlation between discretionary accrual estimates and firm performance. Such correlation has motivated recent studies to control for firm performance by including lagged return on assets (ROA) in the abnormal accrual model (Jones 1991 model) as suggested by Kothari et al. (2005).

Krishnan et al. (2007) examine the abnormal accruals of clients that switched from Big-audit firms to Second-Tier audit firms. They find that relative to two peer groups consisting of

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\(^8\) In an attempt to measure expected audit quality in an objective approach, Blokdijk et al. (2006) use the total audit effort and the allocation of effort to four audit phases, which are planning, (control) risk assessment, substantial testing, and completion.
clients that did not change auditors and clients that changed within Big-audit firms, abnormal accruals are significantly negative in the year of change and continue to be negative even in the year after the change.

Ghosh and Moon (2005) use ERCs from contemporaneous return-earnings regressions as a proxy for investor perceptions of earnings and audit quality. They find that after controlling for all other determinants of ERCs, such as the age of the firm, growth, earnings persistence, earnings volatility, systematic risk, firm size, financial leverage, and regulatory environment, the magnitude of the ERCs increases as the auditor-client relationship lengthens, indicating a higher perception of audit quality.

Kumar and Lim (2007) compare Andersen’s audit quality across a large sample of clients with other Big-audit firms audit quality using three types of analyses. First, they hypothesize that audit quality impacts earnings quality, and investigate Andersen client ERCs versus ERCs for other Big-audit firms’ clients. Second, they hypothesize that audit quality impacts the efficacy of going-concern opinions in predicting bankruptcy, and compare Andersen’s going concern opinions in such prediction with opinions of the other Big-Five. Third, they hypothesize that audit quality impacts auditor propensity to issue a going concern opinion, and investigate Andersen’s likelihood of issuing such opinions relative to other auditors. They find that Andersen’s audit quality is no less than other Big-audit firms audit quality in the years leading up to its failure.

Carey and Simnett (2006) measure the quality of audited financial information using just beating or missing earnings benchmarks. Their findings show that the extent to which key earnings targets are just beaten or missed are consistent with a deterioration in audit quality. Industry expertise is measured using the number of clients in the same industry audited by a particular auditor in the same year. It is an auditor specific measure for audit quality. Jensen
and Payne (2005) use industry expertise as a proxy for auditor quality in examining the links between procurement, audit quality, and audit fees. They find evidence that well-developed audit procurement practices are associated with the hiring of auditors who have higher levels of industry experience, which suggests a higher audit quality.

Audit tenure, as a proxy for audit quality, has contradicting opinions in the auditing literature. One perception is that auditors are more likely to agree with managers on important reporting decisions as the length of the audit engagement increases. Therefore, the longer the auditor tenure the lower the expected audit quality, due to the increased client firms’ influence over auditors (Carey and Simnett 2006). In particular, Carey and Simnett (2006) show that for long audit tenure observations, there is a lower propensity that the auditor will issue a going-concern opinion and they show some evidence that just beating or missing earnings benchmarks increases with long audit tenure. These results support the opinion of a deterioration of audit quality that is associated with long audit tenure.

The opposing viewpoint is that problematic audits occur more frequently for newer clients because auditors have less information about these firms (AICPA 1992; Johnson et al. 2002; Ghosh and Moon 2005; Beck and Wu 2006). Client-specific knowledge of items such as operations, accounting system, and internal control structure is crucial for auditors to detect material errors and misstatements. Johnson et al. (2002) argue that a lack of adequate client-specific knowledge during the early years of an engagement decreases the likelihood of detecting material errors and misstatements. As the auditor-client relationship lengthens, firm-specific expertise allows auditors to rely less on managerial estimates and become more independent of management. Additionally, Beck and Wu (2006) conceptually show that by performing audits over time, auditors accumulate client-specific knowledge so that their posterior beliefs about clients are updated and become more precise, where precision is used as
the surrogate for audit quality. In addition, they show that auditors can enrich their knowledge accumulation by performing non-audit services if they are able to reduce the auditor’s engagement risk by not charging their clients for the non-audit services. This view supports a positive association between audit tenure and audit quality.

In the context of my study, the preceding discussion suggests that audit quality, based on client-specific measures, can be measured using three approaches. These three approaches are the abnormal accruals, ERCs, and audit tenure. However, due to contradicting opinions of previous research, it is hard to predict the direction of audit tenure effect on audit quality.

Due to the similarity between audit quality and earnings quality, I use the Dechow and Dichev (2002) approach in measuring earnings quality to measure audit quality. This approach regresses working capital accruals on cash from operations in the current period, prior period, and future period. The unexplained portion of the variation in working capital accruals is an inverse measure of accruals quality, where a greater unexplained portion implies poorer quality. Following McNichols (2002), I would include the change in revenues and property, plant, and equipment as additional explanatory variables to the Dechow and Dichev (2002) model. The change in sales revenue and property, plant, and equipment are important in forming expectations about current accruals, over and above the effects of operating cash flows. Therefore, adding these variables to the Dechow and Dichev (2002) regression significantly increases its explanatory power, thus reducing measurement error of audit quality.

2.4 Cost of Capital

The cost of capital for a firm is a weighted sum of the cost of equity and the cost of debt. Firms finance their operations by three mechanisms: issuing stock (equity), issuing debt (borrowings) (those two are external financing), and reinvesting prior earnings (internal
financing). The cost of capital serves to connect the firm’s long-term financing decisions directly to its long-term investment decisions, and ultimately to the wealth of its shareholders (Francis et al. 2005). A firm’s cost of capital is of interest to financial managers as well as other parties such as investors and industry regulators. Investors may wish to compare the returns of a company with its cost of capital. Similarly, a regulator may be interested in identifying companies that are earning excessive returns above their cost of capital, and that is exploiting consumers by virtue of their monopolistic position.

The cost of capital figure is usually quoted as a single figure, normally in percentage terms. Yet, a firm may derive its capital from a variety of sources. A firm’s capital structure will usually comprise a mixture of debt and equity finance, which has been acquired at different times in the firm’s history. Each source of finance will have a relevant cost. Combining the respective costs of these sources of finance at any point in time will produce an overall composite cost of capital figure for the firm.

There is a growing literature on the cost of capital and how it is measured. The accounting literature is concerned about the determinants of cost of capital and its relationship to other factors. A significant amount of attention is devoted to the cost of equity capital rather than to the cost of debt. For example, Gebhardt et al. (2001) presented a unique approach to estimate the cost of equity capital. They impose an assumption that a firm’s return-on-equity (ROE) reverts to the industry-level ROE beyond the forecast horizon. They used a discounted residual income model and market prices to estimate an implied cost of capital. They developed a multivariate model for explaining and predicting the implied risk premium. They showed that the ex ante measure of cost of equity capital reflects the large-sample relationship between each firm’s characteristics and the implied cost-of-capital. However, the cost of capital is less sensitive to the day-to-day volatility in individual stock prices.
Easley and O’Hara (2004) investigated the role of information in affecting a firm’s cost of capital. They showed that differences in the composition of information between public and private information affects the cost of capital, with investors demanding a higher return to hold stocks with greater private information. This higher return arises because informed investors are better able to shift their portfolio to incorporate this new information, and uninformed investors are at a disadvantage. They also showed that firms can influence their cost of capital by choosing features like accounting treatments, analyst coverage, and market microstructure.

Easton (2006) examined several methods used in the recent literature to estimate and compare the cost of capital across different accounting/regulatory regimes. He focused on the central importance of expectations of growth beyond the short period for which forecasts of future payoffs (dividends and/or earnings) are available. Easton (2006) showed that assumptions about growth beyond the short-term forecast horizon may seriously affect the estimates of the expected rate of return and may lead to spurious inferences. He also provided suggestions for future research that the emphasis of future work should be on understanding the properties of the estimates of the expected rate of return and improving on them, and that much work must be done before accounting researchers can confidently claim that these methods may be used to estimate and understand differences in cost of capital across accounting regimes.

In an attempt to study the relationship of cost of capital with other financial variables, Francis et al. (2005) investigated the relationship between accruals quality and the costs of debt and equity capital. They found that firms with poor accruals quality have higher ratios of interest expense to interest-bearing debt and lower debt ratings than firms with better quality of accruals. They extended their analyses by investigating whether the pricing of accruals quality differs depending on whether the source of accruals quality is innate, i.e., driven by the firm’s business model and operating environment, or discretionary, i.e., subject to management
interventions. Regardless of the approach used to isolate the components of accrual quality, they found that the cost of capital effect of a unit of discretionary accrual quality is smaller both in magnitude and statistical significance than the cost of capital effect of a unit of innate accrual quality.

Khurana and Raman (2004) utilized the auditee-specific ex ante cost of capital as an observable proxy for financial reporting credibility, and examined whether Big-audit firms significantly enhance the credibility of financial statements by focusing on the association between the ex ante cost of capital and Big-audit firms (versus non-Big audit firms) in the United States, Australia, Canada, and the United Kingdom. They find that Big-audit firms’ clients operating in the United States have a lower ex ante cost of capital than non-Big audit firms’ clients. By contrast, they find no evidence that those Big-audit firms’ clients operating in Australia, Canada, and the United Kingdom have a lower ex ante cost of capital than non-Big audit firms’ clients.

In response to the extensive interest among accounting researchers in the relation between asymmetric information and cost of capital, Hughes et al. (2007) consider the effects of private signals that are informative of both systematic factors and idiosyncratic shocks affecting asset payoffs in a competitive, noisy, rational expectations setting. They show that risk premiums equal products of betas and factor risk premiums, irrespective of information asymmetries. They also show that holding total information constant, greater information asymmetry leads to higher factor risk premiums and, thus, higher costs of capital. Finally, they provide evidence that controlling for betas, there is no cross-sectional effect of information asymmetries on cost of capital.

Lambert et al. (2007) examines whether and how accounting information about a firm reflects in its cost of capital, despite the forces of diversification. They build a model that is
consistent with the Capital Asset Pricing Model and explicitly allows for multiple securities whose cash flows are correlated. They demonstrate that the quality of accounting information can influence the cost of capital, both directly and indirectly. The direct effect occurs because higher quality disclosures affect the firm’s assessed covariances with other firms’ cash flows, which is nondiversifiable. The indirect effect occurs because higher quality disclosures affect a firm’s real decisions, which likely changes the firm’s ratio of the expected future cash flows to the covariance of these cash flows with the sum of all the cash flows in the market. They show that this effect can go in either direction, but also derive conditions under which an increase in information quality leads to an unambiguous decline in the cost of capital.

2.5 Backdating of Executive Stock Options

The use of stock options in executives’ compensation packages has grown rapidly in the past decade (Lee and Alam 2004). Stock options are intended to align the incentives of executives with those of shareholders. With a significant option package, an executive has an incentive to raise the company’s share price, which increases both the value of his or her stock options and shareholder return. ESOs are usually granted at-the-money, i.e., the exercise price of the options is set equal to the market price of the underlying stock on the grant date. Because the option value is higher if the exercise price is lower, executives prefer to be granted options when the stock price is at its lowest. Backdating allows executives to choose a past date when the market price is particularly low, thereby inflating the value of the options (ISS 2006).

Backdating is only one form of dating games that executives play. Backdating involves the executive (with or without the knowledge of the board) designating the grant date to a date before the board made the decision to grant options. This is done to obtain options at a lower
exercise price since the exercise price is usually set equal to the stock price prevailing on the designated grant date. Obviously, it is worthwhile to backdate only if the stock price has been rising in the days before the board decision date.

Once a company has adopted an ESO plan, the board of directors generally assigns the administration of the plan to the compensation committee. The compensation committee officially determines the size and timing of stock option grants. However, there are some reasons to suggest that executives affect these decisions. First, executives often propose the parameters of the stock option grant; whereas, the compensation committee merely approves these proposals. Second, executives might influence the committees’ decisions via their close friendships with individual committee members. Third, executives might influence the timing of the compensation committee meetings, which regularly coincide with the award date (Lie 2005).

Although backdating is the practice that has received the most attention, other dating games are also possible. For example, if the stock price has been falling before the board's decision date, executives can wait to see what the stock price does in the near future before designating a grant date. In this case, backdating would not be worthwhile. If the stock price continues to fall, they can designate a future date as the grant date (Narayanan et al, 2006). Before SOX, companies did not have to report option grants until 45 days after the end of the fiscal year in which they were granted, which provided firms a significant window of time to retroactively match grant dates with the date of the lowest price. Companies now are required to file Form 4 reports on option grants within two business days of the grant date, which limits opportunities for backdating. While SOX has made backdating more difficult, the issues raised by the option timing scandal will remain important for institutional investors and researchers for quite some time. It is still possible for companies to inappropriately time option grants
around the release of corporate news (ISS 2006). Collins et al. (2005) find that the accelerated reporting requirement of SOX significantly reduces executives influence over grant date stock prices in the post-SOX period. Specifically, they find that the accelerated reporting requirement discourages the opportunistic granting of unscheduled awards after bad news announcements and reduces the opportunistic granting of unscheduled awards before good news announcement. They also find that the accelerated reporting requirement prevents the delaying of good news announcements after scheduled options awards.

Heron and Lie (2006) estimate that 23 percent of unscheduled, at-the-money grants to top executives, dated between 1996 and August 2002, were backdated or otherwise manipulated. This fraction was roughly halved as a result of the new two-day reporting requirement that took effect in August 2002. However, among the minority of grants that are filed late (i.e., more than two business days after the purported grant dates), the prevalence of backdating is roughly the same as before August 2002. (The fraction of grants that are filed late is steadily decreasing, but in 2005 it was still approximately 13 percent). While a non-trivial fraction of the grants that are filed on time are also backdated, the benefit of backdating is greatly reduced in such cases. Heron and Lie (2006) also find that the prevalence of backdating differs across firm characteristics; backdating is more common among technology firms, small firms, and firms with high stock price volatility. Finally, Heron and Lie (2006) estimate that almost 30 percent of firms that granted options to top executives between 1996 and 2005 manipulated one or more of these grants in some fashion.

Lie (2005) proposed an explanation for the abnormal return patterns. He believed that the awards might have been timed ex post facto, whereby the grant date is set to be a date in the past on which the stock price was particularly low. Such retroactive timing (backdating process) might be perceived by outsiders to be fraudulent. However, in any event, it is unlikely
that outsiders would ever learn of it, because the company does not publicly report the grant date until months thereafter.

Heron and Lie (2006) suggest that backdating is the major source of the abnormal stock return patterns around ESO grants, and although the SEC implemented changes mandated by SOX and tightened the reporting regulations that executives are required to report stock option grants they receive within two days, backdating has not been eliminated. Heron and Lie (2006) suggest that to eliminate backdating, the requirements need to be tightened further, such that grants have to be reported on the grant day or, at the latest, on the day thereafter. Ultimately, the SEC needs to enforce these requirements.

2.6 Summary

This chapter provides an overview of the pertinent literature relating to this research study. In particular, it reviews agency theory and the role of auditing as the primary source of monitoring the relationship between the principal and the agent. It also discusses the monitoring costs represented in audit fees as one component of the agency costs incurred by shareholders to monitor managers’ actions.

This chapter also reviews the auditor concentration issue, including the main reasons for concentration and the related research during different stages of concentration in the market for audit services. The auditor concentration literature has inconsistent findings related to the effect of concentration on audit fees and audit quality, and presents different consequences of concentration across countries. Additionally, it reviews the literature’s different approaches of measuring audit quality, including abnormal accruals, ERCs, beating or missing earnings benchmarks, and audit tenure.
There is a growing literature on the cost of capital and how to measure it. This chapter also reviews the accounting literature in regards to determinants of the cost of capital, including cost of debt and cost of equity, and its relationship to other factors. Finally, a review of the backdating of ESO literature, which is a growing area of research is conducted. The backdating process and the literature view for detecting backdating of ESOs are discussed.
3.1 Hypotheses

According to Jensen and Meckling (1976), one component of agency costs is monitoring costs incurred by the shareholders to monitor the managers’ actions. Audit fees are an important part of these monitoring costs. Auditors have a duty to ensure that the managers are behaving according to the owners’ interests, while they also have a duty to inspect the company’s accounts. Therefore, agency theory provides a general framework for audit pricing (Nikkinen and Sahlström 2004). Additionally, Puro (1984) argues that changes in accounting rules or regulations can move audit firms away from their clients’ interests to their own interests. In a sense, a classic agency problem will occur when an accounting rule or regulation promises more business to audit firms.

Audit fees in the post-2002 period have been substantially increased due to major SEC regulations. SOX was enacted in July 2002 as a consequence of the Enron, WorldCom, and Anderson failures. Section 404 (1) of SOX requires the SEC to prescribe rules requiring that each annual report filed with the SEC under the 1934 Securities and Exchange Act shall contain an internal control report, which shall state the responsibility of management for establishing and maintaining an adequate internal control structure and procedures for financial reporting and shall contain an assessment of the effectiveness of the internal control structure and procedures of issuer for financial reporting.

Section 404 has increased the costs associated with the internal control report requirement. Audit fees account for a substantial part of these costs associated with the
implementation of section 404. The presence of section 404 creates significant additional work for auditors including (1) additional testing and changes in the audit program, (2) increased partner time related to discussions with client management, and (3) increased documentation related to the decision to classify a weakness as a material weakness, as opposed to a significant deficiency. Such additional work can be expected to increase audit fees (Raghunandan and Rama, 2006).

Professional organizations and others interested in audit fees issues have cited evidence from surveys about the increase of audit fees to smaller firms (PAR 2005; Mergers & Acquisitions: The Dealmaker's Journal 2006). For example, Public Accounting Report indicates that smaller companies are paying bigger percentage increases, as a group, than Fortune 1000 companies paid when it comes to audit fees paid in 2004. Audit fees for 2004 increased 92 percent over 2003 for 573 companies in the S&P 600 smallcap. Audit fees data were analyzed for the 573 companies on the S&P 600 smallcap list that filed audit fees information for 2004, 2003, and 2002. Mergers & Acquisitions: The Dealmaker's Journal (2006) indicated that small and mid-sized public companies continued to pay a stiff price for meeting federally mandated financial compliance rules in 2005. Mergers & Acquisitions: The Dealmaker's Journal (2006) states that,

“An annual survey by Foley & Lardner found small-cap and mid-cap concerns shelling out substantially more in audit fees than in 2004, even as overall costs of being public eased year-over-year. Audit fees surged 22 percent for Standard & Poor's small-cap firms in the sample between 2004 and 2005 and rose by a more moderate 6 percent for S&P mid-cap companies, and 4 percent for S&P 500 companies.”
In the context of my study, the preceding discussion suggests that smaller firms (audit clients) are paying higher audit fees in the post-2002 (post-SOX) period compared to the pre-2002 period. Most of these small and mid-size public firms are audited by Second-Tier audit firms. Therefore, it is hypothesized that audit fees paid to Second-Tier audit firms are higher in the post-2002 period when compared to the pre-2002 period. My first hypothesis (in alternative form) is:

H1: Audit fees paid by clients of Second-Tier audit firms are higher in the post-2002 period compared to the pre-2002 period.

The role of auditing is to dilute the adverse effects of the separation of ownership and control. Lambert (2001) states that,

“The primary feature of agency theory that has made it attractive to accounting researchers is that it allows us to explicitly incorporate conflicts of interest, incentive problems, and mechanisms for controlling incentive problems into the agency theory model. This is important because much of the motivation for accounting and auditing has to do with the control of incentive problems. For example, the reason we insist on having an “independent” auditor is that we do not believe we can trust managers to issue truthful reports on their own.”

The auditor provides “reasonable assurance” that the financial statements are free from “material misstatements.” Thus auditing is a mean of reducing information risk for users of financial statements. However, previous accounting research shows that such reduction of information risk varies from one audit firm to another based on the quality of the audit services
provided. It is argued that investors may perceive Big-audit firms as higher quality audit providers because these firms have more of the observable characteristics associated with quality such as specialized training and structured peer reviews than Second-Tier audit firms. Craswell et al. (1995) indicate that Big-audit firms devote more resources to staff training and development of industry expertise relative to Second-Tier audit firms. Due to their size, Big-audit firms are also likely to invest in information technology and employ state of the art techniques for detecting manipulations than Second-Tier audit firms. Moreover, Big-audit firms are in a better position to negotiate with clients who might adopt aggressive accounting practices.

Krishnan (2005) argues that Big-audit firms have more to lose than Second-Tier audit firms in the event of a loss of reputation. Furthermore, Big-audit firms have greater incentives to protect their reputation than Second-Tier audit firms. Therefore, it is expected that Big-audit firms will drop high risk clients from their client base in the post-2002 period. These dropped clients have no other choice other than hiring a Second-Tier audit firm, which increases the litigation risk of Second-Tier audit firms, and hence their audit quality. For example, the Wall Street Journal reports that between 1994 and 1997, Big-audit firms have dropped 275 publicly traded audit clients due to concerns about potential harm to their reputations or litigation risk. Similar actions are expected to take place in the post-SOX period, especially after the collapse of Arthur Anderson.

Additionally, Khurana and Raman (2004) show that clients of Big-audit firms in the 1990-1999 period have a significantly lower cost of capital compared to clients of non-Big audit firms in the United States, but not in other Anglo-American countries like Australia, Canada, and the United Kingdom.
Taken together, evidence presented by Craswell et al. (1995), Krishnan (2005), and Khurana and Raman (2004) strongly indicates that there is a significant difference in audit quality between Big-audit firms and Second-Tier audit firms and a higher audit quality is associated with Big-audit firms in the post-SOX period. Hence, the second set of hypotheses is stated as follows:

H2a: Audit quality provided by Second-Tier audit firms is less than audit quality provided by Big-audit firms in the post-2002 period.

H2b: Audit quality provided by Second-Tier audit firms declined in the post-2002 period.

Agency theory suggests that credible financial reporting reduces the information asymmetry between corporate managers and stockholders, improves investor confidence, raises the stock price, and thereby makes it less costly for corporations to raise new capital and grow (Jensen and Meckling 1976). Consistent with agency theory, Easley and O’Hara (2004) develop a multi-asset rational expectations model in which the private versus public composition of information affects required returns and subsequently the cost of capital. In their model, relatively more private information increases uninformed investors’ risk of holding the stock because the privately informed investors are better able to shift their portfolio weights to take advantage of new information. Uninformed investors therefore face a form of systematic (i.e., undiversifiable) information risk, and will require higher returns (charge a higher cost of capital) as compensation. Required returns are affected both by the amount of private information and by the precision of public and private information. Easley and O’Hara
(2004) clearly note an important role for precise accounting information in reducing the cost of capital by decreasing the (information-based) systematic risk of shares to uninformed investors.

Francis et al. (2005) show that firms with more information risk will have higher costs of capital, where the information risk concerns the uncertainty or imprecision of information used or desired by investors to price securities. Moreover, they show that firms with poor accruals quality have higher costs of capital than firms with good accruals quality.

To the extent that accruals quality and audit quality reflect some similarities in their effect of investors’ perception of information risk, it is expected that the cost of capital for clients of Second-Tier audit firms to be higher than the cost of capital for clients of Big-audit firms. Hence, the third set of hypotheses is stated as follows:

H3a: Cost of debt for clients of Second-Tier audit firms is higher than cost of debt for clients of Big-audit firms.

H3b: Cost of equity for clients of Second-Tier audit firms is higher than cost of equity for clients of Big-audit firms.

Recent studies revealed abnormal stock price patterns around option grants to executives (e.g., Lie 2005; Heron and Lie 2006; Narayanan et al. 2006). These patterns have been attributed to insiders timing grants before expected future price increases or strategic timing of information releases around grants. Lie (2005) suggests that the patterns are too strong and precise to be explained by only these behaviors. Instead, he proposes that insiders might backdate the grants, whereby insiders choose a past date on which the stock price was particularly low to be the grant date. He reports that not only are the abnormal stock returns high after grants, but also the predicted component of the returns is driven by the entire market.
This suggests that either (i) backdating occurs or (ii) executives can predict with reasonable success the future direction of the market. Heron and Lie (2006) revisited the issue of backdating in the context of ESO grants. They concluded that backdating is the major source of the abnormal stock return patterns around ESO grants. They also showed evidence that the new SOX reporting requirements have greatly limited backdating, but have not eliminated it.

This study extends this new area of research by investigating the role of the audit firm in mitigating the backdating phenomenon. Since Big-audit firms are perceived to be the provider of high quality audits, it is expected that they exert more pressure on their clients in preventing and detecting backdating of ESOs. In contrast, it is expected that Second-Tier audit firms lack the ability to detect backdating of ESOs. Using the level of audit quality as a proxy for auditor ability to predict backdating of ESOs, the prediction that Second-Tier audit firms are less efficient in detecting backdating of ESOs compared to Big-audit firms is formalized. The fourth hypothesis is stated as follows:

H4: Second-Tier audit firms’ clients backdate executive stock options more frequently than Big-audit firms’ clients.

3.2 Methodology

3.2.1 Audit Fees of Second-Tier Audit Firms

In the first part of the analysis, two non-parametric tests, the binomial test and the Wilcoxon signed-ranks test, are conducted to determine whether there is any increase or decrease in audit fees between the pre- and the post-SOX periods for audit clients of Second-Tier audit firms. In the second part of the analysis, the audit pricing model is tested on the same audit clients to examine whether there is any significant difference in the audit fees of
Second-Tier audit firms before and after SOX. Following previous studies, variables predicted to directly influence audit fees are included (Simunic 1980; DeAngelo 1981; Palmrose 1986; Craswell and Francis 1999; and Whisenant et al. 2003). An indicator variable (SOX) is added to the audit pricing model. This dummy variable is used to examine whether there is a significant change in audit fees after SOX. The following model summarizes the conceptual model:

\[ \ln FEE = \alpha + \beta_1 SOX + \beta_2 \text{DETERMINANTS} + \varepsilon, \]  

where \( \ln FEE \) is the natural logarithm of the audit fees paid by audit clients of Second-Tier audit firms, \( SOX \) is an indicator variable for the pre- and post-SOX period, and \( \text{DETERMINANTS} \) is a vector of factors shown to influence audit fees.

The literature on the determinants of audit fees uses observable data as proxies for the supply- and the demand-side factors that generate the outcome of audit services evident in fees.\(^9\) Accordingly, the audit pricing model employed in the study is expressed as follows:

\[
\ln FEE_{it} = \alpha + \beta_1 SOX_{it} + \beta_2 \ln TA_{it} + \beta_3 SEG M_{it} + \beta_4 EMPL_{it} + \beta_5 DA_{it} + \beta_6 CR_{it} \\
+ \beta_7 INVREC_{it} + \beta_8 ROA_{it} + \beta_9 INST_{it} + \beta_{10} FRGN_{it} + \beta_{11} LOSS_{it} \\
+ \beta_{12} GPM_{it} + \beta_{13} BM_{it} + \beta_{14} XIDOD_{it} + \beta_{15} ZSCORE_{it} + \beta_{16} RESTAT + \varepsilon_{it}.
\]

The dependent variable in Model (2) is defined as follows:

\[ \ln FEE_{it} = \text{the natural logarithm of the audit fees paid by audit client } i \text{ in year } t (\text{\$ actual}). \]

The indicator variable in Model (2) is defined as follows:

\[ SOX_{it} = \text{an indicator variable that equals to 1 if audit fees are in the Post-SOX period, 0 otherwise.} \]

The variables in the vector \textit{DETERMINANTS} are measured at the end of the fiscal year, unless otherwise noted, and are defined as follows:

\[ \ln TA_{it} = \text{the natural logarithm of total assets for audit client } i \text{ in year } t \text{ (first measured in } \$ \text{ thousands);} \]

\[ SEGM_{it} = \text{the square root of the numbers of segments disclosed in the segment footnote for audit client } i \text{ in year } t; \]

\[ EMPL_{it} = \text{the square root of the numbers of employees (measured in thousands) disclosed in Form 10-K filing for audit client } i \text{ in year } t; \]

\[ DA_{it} = \text{total debt over total assets for audit client } i \text{ in year } t; \]

\[ CR_{it} = \text{the ratio of current assets divided by current liabilities for audit client } i \text{ in year } t; \]

\[ INVREC_{it} = \text{inventory plus accounts receivable, divided by total assets for audit client } i \text{ in year } t; \]

\[ ROA_{it} = \text{the return on assets, defined as operating income divided by total assets for audit client } i \text{ in year } t; \]

\[ INST_{it} = \text{the percentage of institutional holdings for audit client } i \text{ in year } t; \]

\[ FRGN_{it} = \text{an indicator variable that equals to 1 if audit client } i \text{ has foreign operations in year } t \text{ as indicated by the foreign currency adjustments to income, 0 otherwise;} \]
\( LOSS_{it} = \) an indicator variable that equals to 1 if audit client \( i \) reports negative net income in the previous fiscal year \( t-1 \), 0 otherwise;

\( GPM_{it} = \) the growth rate in sales for audit client \( i \) over the previous fiscal year \( t \);

\( BM_{it} = \) the book-to-market ratio for audit client \( i \) in year \( t \);

\( XIDOD_{it} = \) absolute value of extraordinary items and discontinued operations divided by total assets for audit client \( i \) in year \( t \);

\( ZSCORE_{it} = \) the one-year change in Zimjeweski’s probability of bankruptcy score (Zimjeweski, 1984) for audit client \( i \) in year \( t \);

\( RESTAT_{it} = \) an indicator variable that equals to 1 if the audit client \( i \) restated assets or net income in year \( t \), 0 otherwise.

To eliminate the effect of outliers, extreme values of the distribution are winsorized to the 1 and 99 percentiles. Testing whether the pre- and the post-SOX period have different audit fees structures involves checking whether \( \beta_1 \) is significantly different from zero. The regression is performed on the pre- and the post-SOX period samples. A significant positive value for the SOX coefficient (\( \beta_1 \)) would indicate an increase in audit fees, while a negative value would indicate a decrease in audit fees.

### 3.2.2 Audit Quality and Cost of Capital

This section investigates the relationship between audit quality, measured by accruals quality, and the cost of debt and cost of equity for clients of Second-Tier audit firms. Following previous research (e.g., Francis et al. 2004; Easley and O’Hara 2004; O’Hara 2003), information risk is assumed to be a non-diversifiable risk factor; whereas, information risk is
the likelihood that firm-specific information that is pertinent to investor pricing decisions is of low quality. Therefore, accruals quality tells investors about the mapping of accounting earnings into cash flows. Relatively poor accruals quality weakens this mapping and consequently increases information risk (Francis et al. 2005).

Francis et al. (2005) shows that poor firms with low accruals quality have higher costs of capital than do firms with good accruals quality, which is consistent with the view that information risk, as measured by accruals quality, is a priced risk factor. Therefore, it is expected that clients of Second-Tier audit firms experience a high cost of capital, in comparison to clients of Big-audit firms, due to their lower accruals quality.

The audit quality measure used in this study is based on the Dechow and Dichev’s (2002) model which predicts a relationship between current period working capital accruals and operating cash flows in the prior, current, and future periods. The change in revenues ($\Delta Re$) and property, plant, and equipment ($PPE$) as additional explanatory variables are also included in the model (McNichols 2002). The model is presented as follows:

$$TCA_{jt} = \phi_{0,j} + \phi_{1,j}CFO_{jt-1} + \phi_{2,j}CFO_{jt} + \phi_{3,j}CFO_{jt+1} + \phi_{4,j}\Delta Re_{jt} + \phi_{5,j}PPE_{jt} + \nu_{jt} \quad (3)$$

where, $TCA_{jt} = \Delta CA_{jt} - \Delta CL_{jt} - \Delta Cash_{jt} + \Delta STDEBT_{jt}$ = total current accruals in year $t$; $CFO_{jt} = NIBE_{jt} - TA_{jt}$ = firm $j$’s cash flow from operations in year $t$; $NIBE_{jt} = \text{firm } j\text{'s net income before extraordinary items in year } t$; $TA_{jt} = \Delta CA_{jt} - \Delta CL_{jt} - \Delta Cash_{jt} + \Delta STDEBT_{jt} - DEPN_{jt} = \text{firm } j\text{'s total accruals in year } t$;
\( \Delta CA_{jt} \) = firm \( j \)'s change in current assets between year \( t-1 \) and year \( t \);

\( \Delta CL_{jt} \) = firm \( j \)'s change in current liabilities between year \( t-1 \) and year \( t \);

\( \Delta Cash_{jt} \) = firm \( j \)'s change in cash between year \( t-1 \) and year \( t \);

\( \Delta STDEBT_{jt} \) = firm \( j \)'s change in debt in current liabilities between year \( t-1 \) and year \( t \);

\( DEPN_{jt} \) = firm \( j \)'s depreciation and amortization expense in year \( t \).

\( \Delta Rev_{jt} \) = firm \( j \)'s change in revenues between year \( t-1 \) and year \( t \); and

\( PPE_{jt} \) = firm \( j \)'s gross value of property, plant, and equipment in year \( t \).

The residuals from the regression reflect the accruals that are unrelated to cash flow realizations, and the standard deviation of these residuals is a firm-level of audit quality, where higher standard deviation denotes lower quality. \( AuditQuality \) is equal to the standard deviation of firm \( j \)'s residuals (\( \nu \)), calculated over a five years period (\( t-4 \)) through \( t \). Larger standard deviations of residuals indicate poorer audit quality. However, if the firm has consistent large residuals, so that the standard deviation of those residuals is small, that firm has relatively good audit quality because there is little uncertainty about its accruals. For such a firm, the accruals map poorly into cash flows, but this is a predictable phenomenon, and should not be a reason for uncertainty.

To test the first hypothesis of the second set of hypotheses (H2a), the audit quality measure is regressed on an indicator variable (\( Auditor_{jt} \)) and a set of control variables as follows:
\[ \text{AuditQuality}_j = \phi_0 + \phi_1 \text{Auditor}_j + \phi_2 \text{Size}_j + \phi_3 \sigma(CFO)_j + \phi_4 \sigma(Sales)_j + \phi_5 \text{OperCycle}_j + \phi_6 \text{NegEarn}_j + \mu_j \]  

(4)

where, \( \text{Auditor}_j \) = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm;

\( \text{Size}_j \) = firm size measured as the natural log of total assets in year \( t \);

\( \sigma(CFO)_j \) = standard deviation of firm \( j \)'s CFO, calculated over the past 10 years;

\( \sigma(Sales)_j \) = standard deviation of firm \( j \)'s sales revenue, calculated over the past 10 years;

\( \text{OperCycle}_j \) = natural log of firm \( j \)'s operating cycle, measured as the sum of days accounts receivable and days inventory; and

\( \text{NegEarn}_j \) = number of years, out of the past 10 years, where firm \( j \) reported net income before extraordinary items less than zero.

The control variables used in Model (4) are used to control for firm size and volatility of operations. Larger clients are expected to have lower volatility in total accrual residuals. Clients with larger volatility in cash flows and sales revenue are expected to have higher volatility in total accrual residuals. Similarly, clients with longer operating cycles and negative earnings are expected to have larger volatility in total accrual residuals.

To eliminate the effect of outliers, extreme values of the distribution are winsorized to the 1 and 99 percentiles. Using a set of data for the post-2002 period, a significant positive
coefficient for the auditor variable would support my expectation, where the audit quality provided by Second-Tier firms is less than the audit quality provided by Big-audit firms.

To test the second hypothesis in the second set of hypotheses (H2b), the auditor indicator variable (Auditor) is replaced with another indicator variable (Period), where 1 indicates the post-2002 period and 0 indicates the pre-2002 period. The model is specified as follows:

\[
\text{AuditQuality}_\mu = \phi_0 + \phi_1 \text{Period}_\mu + \phi_2 \text{Size}_\mu + \phi_3 \sigma(CFO)_\mu + \phi_4 \sigma(Sales)_\mu + \phi_5 \text{OperCycle}_\mu + \phi_6 \text{NegEarn}_\mu + \mu
\]  

Equation (5)

A significant positive coefficient for the period variable, using the set of data of Second-Tier firms, would support my expectation that audit quality provided by Second-Tier audit firms declined in the post-2002 period.

As a further test to investigate the effect of audit fees on audit quality, the audit quality measure is regressed on the natural log of audit fees (lnFEE) and the same set of control variables used in Models 4 and 5 as follows:

\[
\text{AuditQuality}_\mu = \phi_0 + \phi_1 \ln \text{FEE}_\mu + \phi_2 \text{Size}_\mu + \phi_3 \sigma(CFO)_\mu + \phi_4 \sigma(Sales)_\mu + \phi_5 \text{OperCycle}_\mu + \phi_6 \text{NegEarn}_\mu + \mu
\]  

Equation (6)

where, lnFEE\_\mu equals the natural logarithm of the audit fees paid by audit client \(i\) in year \(t\) ($ actual).

A significant negative coefficient for the (lnFEE) variable would indicate a positive association between audit fees and the audit quality provided by the audit firm. However, a
significant positive coefficient for the \((lnFEE)\) variable would indicate a negative association between audit fees and the audit quality provided by the audit firm.

### 3.2.3 Cost of Capital Components

In the next stage, the relationship between accruals quality and the components of cost of capital is examined. Clients with poorer accruals quality (clients of Second-Tier audit firms) are expected to have a higher cost of debt, measured as the ratio of interest expense to interest-bearing debt, than clients with better accruals quality (clients of Big-audit firms). Similarly, in terms of cost of equity, it is expect that clients with poorer accruals quality have a higher cost of equity than clients with better accruals quality.

To test the first hypothesis of the third set of hypotheses (H3a), the cost of debt \((CostDebt)\), measured as the ratio of interest expense to interest-bearing debt, is regressed on the indicator variable \((Auditor)\), the audit quality measure \((AuditQuality)\), and a set of control variables as follows:

\[
CostDebt_{jt} = \phi_0 + \phi_1 Auditor_{jt} + \phi_2 AuditQuality_{jt} + \phi_3 \ln(Leverage)_{jt} + \phi_4 Size_{jt} \\
+ \phi_5 ROA_{jt} + \phi_6 IntCov_{jt} + \phi_7 \sigma(NIBE)_{jt} + \mu_{jt}
\]  

(7)

where, \(Auditor_{jt}\) = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm;

\(AuditQuality\) = standard deviation of firm \(j\)’s residuals \((\nu)\), calculated over a five years period \((t-4)\) through \(t\);
\[ \ln(\text{Leverage}_j) = \text{natural log of firm } j \text{'s ratio of interest bearing debt to total assets in year } t; \]

\[ \text{Size}_j = \text{natural log of firm } j \text{'s total assets in year } t; \]

\[ \text{ROA}_j = \text{firm } j \text{'s return on assets in year } t; \]

\[ \text{IntCov}_j = \text{firm } j \text{'s ratio of operating income to interest expense in year } t; \]

\[ \sigma(\text{NIBE})_j = \text{standard deviation of firm } j \text{'s net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period; five observations of NIBE at least are required to calculate the standard deviation.} \]

\[ \ln(\text{Leverage}) \text{ is included in Model (7) because it is expected that riskier firms have a larger cost of debt. } \text{Size}_j \text{ controls the firms’ size, where it is expected to have a negative sign. } \]

\[ \text{ROA} \text{ and } \text{IntCov} \text{ are expected to be negatively related to cost of debt; while, } \sigma(\text{NIBE}) \text{ is expected to positively associated with cost of debt.} \]

\[ \text{A significant positive coefficient for the auditor indicator variable (Auditor), using a full data set of Second-Tier audit firms and Big-audit firms, would support the expectation that the cost of debt for clients of Second-Tier audit firms is higher than the cost of debt for clients of Big-audit firms. Similarly, a significant positive coefficient for the audit quality variable (AuditQuality) would indicate that the level of audit quality provided has an effect on the cost of debt.} \]

\[ \text{To test the second hypothesis of the third set of hypotheses (H3b), the cost of equity (CostEquity) is regressed on the indicator variable (Auditor) and a set of control variables. Following Khurana and Raman (2004) and Fernando et al. (2006), the Price/Earnings/Growth} \]
(PEG) approach of measuring the cost of equity suggested by Easton (2004) is applied in the primary part of the study. The PEG approach is based on a model of earnings and earnings growth, and is consistent with analysts’ pervasive focus on forecasts of earnings and earnings growth. Under the PEG approach, the firm specific ex ante cost of equity is estimated as the square root of the inverse of the price-earnings growth ratio. Specifically:

\[
\text{CostEquity}_j = \sqrt{\frac{\text{eps}_2 - \text{eps}_1}{P_0}}
\]

where, \(\text{eps}_1\) = one-year ahead mean analysts’ earnings forecast per share;

\(\text{eps}_2\) = two-year ahead mean analysts’ earnings forecast per share;

\(P_0\) = fiscal year-end price per share\(^{10}\).

Three other measures for generating cost of equity are used in this study (see Appendix A). These measures follow the methodology used in Gode and Mohanram (2003), Gebhardt et al. (2001), and Claus and Thomas (2001).

The cost of equity regression model is specified as follows:

\[
\text{CostEquity}_\mu = \phi_0 + \phi_1 \text{Auditor}_\mu + \phi_2 \text{AuditQuality}_\mu + \phi_3 \ln(\text{Leverage})_\mu \\
+ \phi_4 \text{Size}_\mu + \phi_5 \text{BETA}_\mu + \phi_6 \text{VAR}_\mu + \phi_7 \ln(B/M)_\mu + \phi_8 \text{Growth}_\mu + \mu_\mu
\]  

\(^{10}\) For example, for a firm-year observation with fiscal year ending December 31, 2001, I will use as \(\text{eps}_1\) and \(\text{eps}_2\) the earnings forecasts (available on I/B/E/S as of December 31, 2001) for fiscal year ending December 31, 2002 and 2003, respectively. \(P_0\) is the December 31, 2001 closing price.
where, \(\text{Auditor}_{jt}\) = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm;
\(\text{AuditQuality} = \) standard deviation of firm \(j\)’s residuals (\(\nu\)), calculated over a five years period (\(t-4\)) through \(t\);
\(\ln(\text{Leverage})_{jt} = \) natural log of firm \(j\)’s ratio of interest bearing debt to total assets in year \(t\);
\(\text{Size}_{jt} = \) natural log of firm \(j\)’s total assets in year \(t\);
\(\text{BETA}_{jt} = \) stock beta (systematic risk) calculated over 60 months ending in the month of the fiscal-year-end;
\(\text{VAR}_{jt} = \) earnings variability of firm \(j\) measured by the dispersion in analysts’ earnings forecasts available on I/B/E/S database during the fiscal year-end \(t\);
\(\ln(\text{B/M})_{jt} = \) natural log of firm \(j\)’s ratio of book value of equity to market value of equity as of fiscal year-end \(t\); and
\(\text{Growth}_{jt} = \) forecasted growth of firm \(j\) measured as the difference between the mean analysts’ two and one-year ahead earnings forecast scaled by the one-year ahead earnings forecast.

Similar to Model (7), \(\ln(\text{Leverage})\) is included in Model (8) because it is expected that riskier firms have a larger cost of equity. \(\text{Size}\) controls the firms’ size, where it is expected to have a negative sign. The stock beta (\(\text{BETA}\)) is added to Model (8) because the capital asset pricing model suggests that systematic risk (beta) is positively correlated with the cost of equity. Hence, \(\text{BETA}\) is expected to be positively associated with cost of equity. The
dispersion in analysts’ forecasts of earnings \( (VAR) \) is utilized as a proxy for earnings variability. In Model (8), \( VAR \) is expected to have a positive sign. In addition, given the risk interpretation of the book-to-market ratio in Fama and French (1993), the \( \ln(B/M) \) is included as a control variable. The higher the book-to-market ratio the higher the risk factor is expected to be. Hence, \( \ln(B/M) \) is expected to have a positive sign. \( Growth \) is also included in Model (8) because earnings derived from growth opportunities are more uncertain than normal earnings, and that there is a positive association between growth and risk. For this reason, \( Growth \) is expected to have a positive sign.

### 3.2.4 Backdating of Stock Options

To examine the relationship between backdating of ESOs and audit firms, this study follows Lie (2005) approach of detecting backdating of ESOs. A sample of ESOs awards is taken from the Standard & Poor’s ExecuComp database. An inferred date for the ESO grant date is identified by subtracting the ESO life from the expiration date. In the next stage, the ESO award is classified as scheduled if it occurs within one week of the one-year anniversary of the prior year’s award date and unscheduled if it does not occur within one week of this anniversary or if no options were awarded during the prior year. This study focuses on the unscheduled ESO awards as these are the possibly backdated ESOs.

Abnormal returns around ESOs awards are calculated as the difference between the stock returns of the awarding firm and the returns predicted by Fama and French’s (1993) three factor model, where the estimation period is the year ending 50 days before the ESO’s award date. The stock returns are obtained in the Center for Research and Security Prices database (CRSP). The Fama and French (1993) three-factor model predicts excess stock returns (in
percent) by adding the excess market return and mimicking returns for the size (SMB) and book-to-market equity (HML) factors. The model is presented as follows:

\[ R(t) = RF(t) = a + b[RM(t) - RF(t)] + SMB(t) + HML(t) + e(t) \]  

(9)

where,

\( R(t) = \) stock returns in percent;

\( RF(t) = \) one month Treasury bill rate observed at the beginning of the month;

\( RM(t) = \) value-weighted percent monthly return on all the stocks in the sample;

\( SMB(t) = \) (Small minus big) is the return on the mimicking portfolio for the size factor in stock returns; and

\( HML(t) = \) (High minus low) is the return on the mimicking portfolio for the book-to-market factor.

The ESOs awards are then partitioned into awards related to firms audited by Big-audit firms and firms that are audited by Second-Tier audit firms. A graphical presentation of the cumulative abnormal stock returns from Day –30 through Day +30 around ESOs grants is used to compare the two groups of data sets.
CHAPTER 4

RESULTS

4.1 Introduction

This chapter provides results of tests of hypotheses described in the previous chapter. The results are discussed in four sections: (1) audit fees for clients of Second-Tier audit firms, (2) audit quality of Second-Tier audit firms, (3) cost of capital for clients of Second-Tier audit firms, and (4) backdating of ESOs for clients of Second-Tier audit firms. The descriptive statistics of the data are displayed at the beginning of each section, followed by hypotheses testing and discussion of the results.

4.2 Audit fees for clients of Second-Tier audit firms

4.2.1 Sample

Table 1 summarizes the sample selection process pertaining to audit fees and the firm-year distribution by audit firm size and by industry. Panel A of Table 1 shows that the sample comprises all firm-year observations in the S&P Audit Fees Database for the period from 2000 to 2005. The year 2000 is the starting point because this is the year where the SEC required publicly traded firms to disclose classified fees for audit and non-audit services. It is also the first year available in the S&P Audit Fees Database. On the other hand, 2005 is the last year audit fees data is available. Financial data are extracted from the annual database of Standard & Poor’s COMPUSTAT Industrial and Research files, where 689 firm-year observations are excluded from the data set due to
TABLE 1
Selection Procedure and Distribution of Sample by Audit Firm Size and Industry

Panel A: Selection Criteria

<table>
<thead>
<tr>
<th>Year</th>
<th>Original Observations</th>
<th>Missing Observations</th>
<th>Final Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>48</td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>2001</td>
<td>127</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>2003</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>137</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>

Less: Total missing firm-year observations in COMPUSTAT (689)
Less: Financial statement information missing in COMPUSTAT (15,538)
Less: Financial service firms with SIC codes 6000 – 6999 (464)
Final sample 17,269

Panel B: Distribution of Sample by Audit Firm Size

<table>
<thead>
<tr>
<th>Audit Firm Size</th>
<th>Original Observations</th>
<th>Missing Observations</th>
<th>Final Observations</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big-audit firm</td>
<td>26,631</td>
<td>12,668</td>
<td>13,963</td>
<td>80.86</td>
</tr>
<tr>
<td>Second-Tier audit firm</td>
<td>7,329</td>
<td>4,023</td>
<td>3,306</td>
<td>19.14</td>
</tr>
<tr>
<td>Total</td>
<td>33,960</td>
<td>16,691</td>
<td>17,269</td>
<td>100.00</td>
</tr>
</tbody>
</table>
missing ticker information. 15,538 firm-year observations are also excluded due to missing
financial statement information in *COMPUSTAT*. In addition, 464 firm-year observations from
financial service firms with SIC codes 6000 – 6999 are excluded because disclosure
requirements and accounting rules are significantly different for these firms. This results in a
final data set that consists of 17,269 firm-year observations, where 3,306 (13,963) firm-year
observations are related to clients of Second-Tier audit (Big-audit) firms. Panel B of Table 1
indicates that observations pertaining to Second-Tier audit firms approximate 19.14% of total
observations on the audit fees database. To eliminate the effect of outliers, extreme values of
the distribution are winsorized to the 1 and 99 percentiles.

Panel C of Table 1 summarizes industry distribution of the selected sample. It shows
that the sample distribution is closely similar to the distribution of the original *COMPUSTAT*
data set. There is slightly higher concentration in the manufacturing industry of durables for
both Second-Tier audit firms and Big-Audit firms compared to the *COMPUSTAT* data (36.39
percent and 32.86 percent, respectively). On the other hand, the transportation and utilities
industry has a lot of missing information that made its concentration for Second-Tier audit
firms and Big-Audit firms much less than its concentration in the *COMPUSTAT* data (5.75
percent and 9.74 percent, respectively). 11

### 4.2.2 Descriptive Statistics

Table 2 provides descriptive statistics for the variables used in the analysis of audit fees
paid to audit firms. Panel A of Table 2 provides descriptive statistics for all audit firms. Panels
B and C of Table 2 provide descriptive statistics for Second-Tier audit firms and Big-audit

---

11 For robustness purpose, the transportation and utilities industry are dropped from the data set in an
additional test. Results are still consistent with the results using the full data set.
## TABLE 2
Descriptive Statistics of Audit Fees and Control Variables

### Panel A: All audit firms (n = 17,269)

<table>
<thead>
<tr>
<th>Variable Description (Names)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>10th percentile</th>
<th>90th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit fees (FEE)</td>
<td>$987,036</td>
<td>$1,755,155</td>
<td>$358,000</td>
<td>$60,200</td>
<td>$2,100,000</td>
</tr>
<tr>
<td>Natural log of FEE (lnFEE)</td>
<td>12.911</td>
<td>1.291</td>
<td>12.788</td>
<td>11.005</td>
<td>14.557</td>
</tr>
<tr>
<td><strong>Independent variables (continuous):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total assets (TA)</td>
<td>$1,862,105</td>
<td>$5,283,017</td>
<td>$241,804</td>
<td>$12,218</td>
<td>$3,907,240</td>
</tr>
<tr>
<td>Natural log of TA (lnTA)</td>
<td>12.449</td>
<td>2.056</td>
<td>12.396</td>
<td>9.411</td>
<td>15.178</td>
</tr>
<tr>
<td>Square root of segments (SEGM)</td>
<td>1.412</td>
<td>0.493</td>
<td>1.000</td>
<td>1.000</td>
<td>2.000</td>
</tr>
<tr>
<td>Square root of employees (EMPL)</td>
<td>1.776</td>
<td>2.074</td>
<td>1.031</td>
<td>0.219</td>
<td>3.911</td>
</tr>
<tr>
<td>Debt to assets (DA)</td>
<td>0.514</td>
<td>0.558</td>
<td>0.464</td>
<td>0.157</td>
<td>0.897</td>
</tr>
<tr>
<td>Current assets to current liabilities (CR)</td>
<td>3.056</td>
<td>3.188</td>
<td>2.061</td>
<td>0.794</td>
<td>6.154</td>
</tr>
<tr>
<td>Inventory and receivables (INVREC)</td>
<td>0.255</td>
<td>0.191</td>
<td>0.222</td>
<td>0.025</td>
<td>0.539</td>
</tr>
<tr>
<td>Return on assets (ROA)</td>
<td>-0.029</td>
<td>0.398</td>
<td>0.059</td>
<td>-0.382</td>
<td>0.164</td>
</tr>
<tr>
<td>Institutional ownership (INST)</td>
<td>54.471</td>
<td>33.705</td>
<td>59.820</td>
<td>0.185</td>
<td>94.108</td>
</tr>
<tr>
<td>Growth rate in sales (GPM)</td>
<td>0.212</td>
<td>0.730</td>
<td>0.084</td>
<td>-0.221</td>
<td>0.169</td>
</tr>
<tr>
<td>Book-to-market ratio (BM)</td>
<td>0.488</td>
<td>3.102</td>
<td>0.437</td>
<td>0.073</td>
<td>1.437</td>
</tr>
<tr>
<td>Extraordinary items (XIDOD)</td>
<td>0.010</td>
<td>0.080</td>
<td>0.000</td>
<td>0.000</td>
<td>0.009</td>
</tr>
<tr>
<td>Bankruptcy score (ZSCORE)</td>
<td>4.248</td>
<td>9.573</td>
<td>3.271</td>
<td>-1.734</td>
<td>11.167</td>
</tr>
<tr>
<td><strong>Independent variables (categorical):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre- or post-SOX period (SOX)</td>
<td>57.17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign operations (FRGN)</td>
<td>18.88%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss in previous fiscal year (LOSS)</td>
<td>38.82%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restatements (RESTAT)</td>
<td>97.38%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Panel B: Second-Tier firms (n = 3,306)

<table>
<thead>
<tr>
<th>Variable Description (Names)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>10th percentile</th>
<th>90th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit fees ($FEE$)</td>
<td>$212,425</td>
<td>$312,154</td>
<td>$110,484</td>
<td>$31,544</td>
<td>$378,000</td>
</tr>
<tr>
<td>Natural log of $FEE$ (lnFEE)</td>
<td>11.723</td>
<td>0.961</td>
<td>11.613</td>
<td>10.359</td>
<td>12.843</td>
</tr>
<tr>
<td><strong>Independent variables (continuous):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total assets ($TA$)</td>
<td>$99,903</td>
<td>$278,259</td>
<td>$24,356</td>
<td>$2,439</td>
<td>$221,741</td>
</tr>
<tr>
<td>Natural log of $TA$ (lnTA)</td>
<td>10.163</td>
<td>1.592</td>
<td>10.101</td>
<td>7.799</td>
<td>12.309</td>
</tr>
<tr>
<td>Square root of segments ($SEGM$)</td>
<td>1.291</td>
<td>0.421</td>
<td>1.000</td>
<td>1.000</td>
<td>2.000</td>
</tr>
<tr>
<td>Square root of employees ($EMPL$)</td>
<td>0.571</td>
<td>0.654</td>
<td>0.366</td>
<td>0.095</td>
<td>1.109</td>
</tr>
<tr>
<td>Debt to assets ($DA$)</td>
<td>0.732</td>
<td>1.796</td>
<td>0.442</td>
<td>0.149</td>
<td>1.273</td>
</tr>
<tr>
<td>Current assets to current liabilities ($CR$)</td>
<td>2.950</td>
<td>3.624</td>
<td>1.893</td>
<td>0.402</td>
<td>6.058</td>
</tr>
<tr>
<td>Inventory and receivables ($INVREC$)</td>
<td>0.310</td>
<td>0.228</td>
<td>0.275</td>
<td>0.012</td>
<td>0.639</td>
</tr>
<tr>
<td>Return on assets ($ROA$)</td>
<td>-0.256</td>
<td>1.197</td>
<td>0.007</td>
<td>-0.933</td>
<td>0.144</td>
</tr>
<tr>
<td>Institutional ownership ($INST$)</td>
<td>20.924</td>
<td>25.280</td>
<td>9.670</td>
<td>0.008</td>
<td>59.646</td>
</tr>
<tr>
<td>Growth rate in sales ($GPM$)</td>
<td>0.334</td>
<td>1.498</td>
<td>0.069</td>
<td>-0.343</td>
<td>0.768</td>
</tr>
<tr>
<td>Book-to-market ratio ($BM$)</td>
<td>0.225</td>
<td>8.594</td>
<td>0.411</td>
<td>-0.108</td>
<td>1.580</td>
</tr>
<tr>
<td>Extraordinary items ($XIDOD$)</td>
<td>0.023</td>
<td>0.274</td>
<td>0.000</td>
<td>0.000</td>
<td>0.009</td>
</tr>
<tr>
<td>Bankruptcy score ($ZSCORE$)</td>
<td>-0.805</td>
<td>31.280</td>
<td>2.738</td>
<td>-13.848</td>
<td>12.020</td>
</tr>
<tr>
<td><strong>Independent variables (categorical):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre- or post-SOX period ($SOX$)</td>
<td>68.96%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign operations ($FRGN$)</td>
<td>10.39%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss in previous fiscal year ($LOSS$)</td>
<td>51.93%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restatements ($RESTAT$)</td>
<td>96.37%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Panel C: Big-audit firms (n = 13,963)

<table>
<thead>
<tr>
<th>Variable Description (Names)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>10th percentile</th>
<th>90th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit fees (FEE)</td>
<td>$1,147,824</td>
<td>$1,954,560</td>
<td>$451,000</td>
<td>$90,000</td>
<td>$2,505,448</td>
</tr>
<tr>
<td><strong>Independent variables (continuous):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total assets (TA)</td>
<td>$2,356,086</td>
<td>$6,216,092</td>
<td>$371,765</td>
<td>$32,237</td>
<td>$5,546,980</td>
</tr>
<tr>
<td>Natural log of TA (lnTA)</td>
<td>12.899</td>
<td>1.909</td>
<td>12.826</td>
<td>10.381</td>
<td>15.529</td>
</tr>
<tr>
<td>Square root of segments (SEGM)</td>
<td>1.444</td>
<td>0.507</td>
<td>1.000</td>
<td>1.000</td>
<td>2.236</td>
</tr>
<tr>
<td>Square root of employees (EMPL)</td>
<td>2.039</td>
<td>2.228</td>
<td>1.261</td>
<td>0.318</td>
<td>4.472</td>
</tr>
<tr>
<td>Debt to assets (DA)</td>
<td>0.492</td>
<td>0.312</td>
<td>0.476</td>
<td>0.159</td>
<td>0.856</td>
</tr>
<tr>
<td>Current assets to current liabilities (CR)</td>
<td>3.040</td>
<td>3.110</td>
<td>2.052</td>
<td>0.878</td>
<td>6.167</td>
</tr>
<tr>
<td>Inventory and receivables (INVREC)</td>
<td>0.243</td>
<td>0.180</td>
<td>0.212</td>
<td>0.028</td>
<td>0.506</td>
</tr>
<tr>
<td>Return on assets (ROA)</td>
<td>0.001</td>
<td>0.263</td>
<td>0.064</td>
<td>-0.283</td>
<td>0.168</td>
</tr>
<tr>
<td>Institutional ownership (INST)</td>
<td>60.798</td>
<td>31.599</td>
<td>67.832</td>
<td>1.205</td>
<td>96.017</td>
</tr>
<tr>
<td>Growth rate in sales (GPM)</td>
<td>0.203</td>
<td>0.649</td>
<td>0.086</td>
<td>-0.192</td>
<td>0.595</td>
</tr>
<tr>
<td>Book-to-market ratio (BM)</td>
<td>0.502</td>
<td>3.114</td>
<td>0.443</td>
<td>0.110</td>
<td>1.403</td>
</tr>
<tr>
<td>Extraordinary items (XIDOD)</td>
<td>0.009</td>
<td>0.070</td>
<td>0.000</td>
<td>0.000</td>
<td>0.009</td>
</tr>
<tr>
<td>Bankruptcy score (ZSCORE)</td>
<td>4.716</td>
<td>7.383</td>
<td>3.278</td>
<td>-0.317</td>
<td>11.003</td>
</tr>
<tr>
<td><strong>Independent variables (categorical):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre- or post-SOX period (SOX)</td>
<td>52.04%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign operations (FRGN)</td>
<td>20.86%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss in previous fiscal year (LOSS)</td>
<td>35.77%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restatements (RESTAT)</td>
<td>97.62%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Definitions for the audit fees dependent variable and the included determinants in the audit pricing model are measured at the end of fiscal year, unless otherwise noted:

\[ \ln FEE_{it} = \text{the natural logarithm of the audit fees paid by audit client } i \text{ in year } t \text{ ($ actual).} \]

\[ SOX_{it} = \text{an indicator variable that equals to 1 if audit fees are in the Post-SOX period, 0 otherwise.} \]

\[ \ln TA_{it} = \text{the natural logarithm of total assets for audit client } i \text{ in year } t \text{ (first measured in $ thousands).} \]

\[ \text{SEGM}_{it} = \text{the square root of the numbers of segments disclosed in the segment footnote for audit client } i \text{ in year } t. \]

\[ \text{EMPL}_{it} = \text{the square root of the numbers of employees (measured in thousands) disclosed in Form 10-K filing for audit client } i \text{ in year } t. \]

\[ DA_{it} = \text{total debt over total assets for audit client } i \text{ in year } t. \]

\[ CR_{it} = \text{the ratio of current assets divided by current liabilities for audit client } i \text{ in year } t. \]

\[ \text{INVREC}_{it} = \text{inventory plus accounts receivable, divided by total assets for audit client } i \text{ in year } t. \]

\[ ROA_{it} = \text{the return on assets, defined as operating income divided by total assets for audit client } i \text{ in year } t. \]

\[ INST_{it} = \text{the percentage of institutional holdings for audit client } i \text{ in year } t. \]

\[ FRGN_{it} = \text{an indicator variable that equals to 1 if audit client } i \text{ has foreign operations in year } t \text{ as indicated by the foreign currency adjustments to income, 0 otherwise.} \]

\[ LOSS_{it} = \text{an indicator variable that equals to 1 if audit client } i \text{ reports negative net income in the previous fiscal years } t, 0 \text{ otherwise.} \]

\[ GPM_{it} = \text{the growth rate in sales for audit client } i \text{ over the previous fiscal year } t. \]

\[ BM_{it} = \text{the book-to-market ratio for audit client } i \text{ in year } t. \]

\[ XIDOD_{it} = \text{absolute value of extraordinary items and discontinued operations divided by total assets for audit client } i \text{ in year } t. \]

\[ ZSCORE_{it} = \text{the one-year change in Zimjeweski’s probability of bankruptcy score (Zimjeweski, 1984) for audit client } i \text{ in year } t. \]

\[ RESTAT_{it} = \text{an indicator variable that equals to 1 if the audit client } i \text{ restated assets or net income in year } t, 0 \text{ otherwise.} \]
firms, respectively. Audit fees ($ actual) and log transformation of audit fees are reported. Total assets ($ thousands) and log transformation of total assets are also reported. The actual values of the audit fees variable are used so that log transformations are performed on values greater than 1. For the same reason, log transformations of total assets are used. By comparing median values of audit fees and total assets, it can be observed that the amount of audit fees paid for every $1,000 of total assets is more for clients of Second-Tier audit firms than for clients of Big-audit firms. In Panel B of Table 2, it can be observed that approximately $4.5 of audit fees are paid for every $1,000 of total assets. However, in Panel C of Table 2 audit fees are equal to approximately $1.2 for every $1,000 of total assets.

Other descriptive statistics are also worth noting. For example, the median growth rate in sales for clients of Second-Tier audit (Big-audit) firms is 6.9% (8.6%), whereas 51.93% (35.77%) of the sample of these clients had a loss in the previous fiscal year. The data also shows that 10.39% (20.86%) of the clients of Second-Tier audit (Big-audit) firms have foreign operations.

Table 3 reports the Pearson and Spearman correlations between the natural log of audit fees and the variables used in the analysis of the audit pricing model using the data set of all audit firms. Numbers above the diagonal represent Pearson correlations, while numbers below the diagonal represent Spearman correlations. It can be seen that the natural log of audit fees (\( \ln FEE \)) is significantly correlated with each of its components, except the Zimjeweski’s probability of bankruptcy score (\( ZSCORE \)).\(^\text{12}\) The natural log of audit fees (\( \ln FEE \)) and the natural log of total assets (\( \ln TA \)) are strongly positively correlated (Pearson correlation = 0.81; Spearman correlation = 0.81). Similarly, the variables for the number of segments

\(^{12}\) Spearman correlations show a significant negative correlation between the natural log of audit fees (\( \ln FEE \)) and Zimjeweski’s probability of bankruptcy score (\( ZSCORE \)). However, Pearson correlations show a positive insignificant correlation between these two variables.
(SEGM), number of employees (EMPL), debt to assets ratio (DA), return on assets (ROA), percentage of institutional holdings (INST), and foreign operations indicator (FRGN) are positively correlated with the natural log of audit fees (lnFEE) (Pearson correlations = 0.40, 0.63, 0.04, 0.25, 0.52, 0.26; Spearman correlations = 0.37, 0.72, 0.26, 0.27, 0.53, 0.25, respectively). However, the variables for the current ratio (CR), inventory and receivable (INVREC), previous year negative net income indicator (LOSS), and book to market ratio (BM) are negatively correlated with the natural log of audit fees (lnFEE) (Pearson correlations = -0.23, -0.08, -0.22, -0.02; Spearman correlations = -0.19, -0.02, -0.22, -0.05, respectively).

Pearson and Spearman correlations have inconsistent correlation signs between the natural log of audit fees (lnFEE) and the variables for the growth rate in sales (GPM), extraordinary items and discontinued operations (XIDOD), Zimjeweski’s probability of bankruptcy score (ZSCORE), and restated assets or net income indicator (RESTAT).

Finally, the only independent variables showing consistent correlations above 0.50 are the natural log of total assets (lnTA) and the number of employees (EMPL) (Pearson correlation = 0.63; Spearman correlation = 0.72), and the natural log of total assets (lnTA) and the percentage of institutional holdings (INST) (Pearson correlation = 0.63; Spearman correlation = 0.64). The correlation between these variables could result into multicollinearity problem in the multivariate analysis. However, the variance inflation factor (VIF) for these two variables indicates that there is no multicollinearity problem in the analysis.
### TABLE 3

**Correlation Coefficients for Audit Fees and Control Variables (n = 17,269)**

<table>
<thead>
<tr>
<th></th>
<th>lnFEE</th>
<th>SOX</th>
<th>lnTA</th>
<th>SEGM</th>
<th>EMPL</th>
<th>DA</th>
<th>CR</th>
<th>INVREC</th>
<th>ROA</th>
<th>INST</th>
<th>FRGN</th>
<th>LOSS</th>
<th>GPM</th>
<th>BM</th>
<th>XIDOD</th>
<th>ZSCORE</th>
<th>RESTAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnFEE</td>
<td>1.000</td>
<td>0.240</td>
<td>0.810</td>
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<td>0.050</td>
<td>0.030</td>
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<td>-0.140</td>
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<td>0.010</td>
<td>-0.030</td>
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<td>-0.010</td>
<td>0.010</td>
<td>0.040</td>
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<td>-0.020</td>
<td>-0.020</td>
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</tr>
</tbody>
</table>

Note: The table shows the correlation coefficients for various variables. The values range from -1 to 1, where 1 indicates a perfect positive correlation, 0 indicates no correlation, and -1 indicates a perfect negative correlation.
Pearson coefficients above the diagonal line and Spearman coefficients below the line.
p-values shown below correlation coefficients.
Definitions for all variable are as follows:
in FEE<sub>t</sub> = the natural logarithm of the audit fees paid by audit client <i>i</i> in year <i>t</i> ($ actual).
SOX<sub>t</sub> = an indicator variable that equals to 1 if audit fees are in the Post-SOX period, 0 otherwise.
in TA<sub>t</sub> = the natural logarithm of total assets for audit client <i>i</i> in year <i>t</i> (first measured in $ thousands).
SEGM<sub>t</sub> = the square root of the numbers of segments disclosed in the segment footnote for audit client <i>i</i> in year <i>t</i>.
EMPL<sub>t</sub> = the square root of the numbers of employees (measured in thousands) disclosed in Form 10-K filing for audit client <i>i</i> in year <i>t</i>.
DA<sub>t</sub> = total debt over total assets for audit client <i>i</i> in year <i>t</i>.
CR<sub>t</sub> = the ratio of current assets divided by current liabilities for audit client <i>i</i> in year <i>t</i>.
INVREC<sub>t</sub> = inventory plus accounts receivable, divided by total assets for audit client <i>i</i> in year <i>t</i>.
ROA<sub>t</sub> = the return on assets, defined as operating income divided by total assets for audit client <i>i</i> in year <i>t</i>.
INST<sub>t</sub> = the percentage of institutional holdings for audit client <i>i</i> in year <i>t</i>.
FRGN<sub>t</sub> = an indicator variable that equals to 1 if audit client <i>i</i> has foreign operations in year <i>t</i> as indicated by the foreign currency adjustments to income, 0 otherwise.
LOSS<sub>t</sub> = an indicator variable that equals to 1 if audit client <i>i</i> reports negative net income in the previous fiscal years <i>t</i>, 0 otherwise.
GPM<sub>t</sub> = the growth rate in sales for audit client <i>i</i> over the previous fiscal year <i>t</i>.
BM<sub>t</sub> = the book-to-market ratio for audit client <i>i</i> in year <i>t</i>.
XIDOD<sub>t</sub> = absolute value of extraordinary items and discontinued operations divided by total assets for audit client <i>i</i> in year <i>t</i>.
ZSCORE<sub>t</sub> = the one-year change in Zimjeweski’s probability of bankruptcy score (Zimjeweski, 1984) for audit client <i>i</i> in year <i>t</i>.
RESTAT<sub>t</sub> = an indicator variable that equals to 1 if the audit client <i>i</i> restated assets or net income in year <i>t</i>, 0 otherwise.
4.2.3 Non-Parametric Tests

Following Maher et al. (1992), a Binomial test and a Wilcoxon signed-rank test are conducted to determine whether there is any increase in audit fees between the pre- and the post-SOX periods for audit clients of Second-Tier audit firms.

Table 4 shows that audit fees increased for 112 firms and decreased for 3 firms between the period of 2000 and 2005. The binomial test indicates that the number of firms audited by Second-Tier audit firms reporting an increase in audit fees is significantly higher than the number of firms reporting a decrease (p<0.05).

The binomial test is also conducted after controlling for size, which is an important determinant of audit fees. Total assets are used to control for the change in size of the audit client firm. After controlling for size, the binomial test shows that audit fees increased for 87 of the 115 audit client firms in the sample, which is significantly more than half the sample as for the binomial test. To test the sensitivity of the results to the measure of the size of the audit client firm, the binomial test is conducted using the natural logarithm of audit fees and size. The results are found to be unaffected by this alternative measure.

Table 4 also shows the results of the Wilcoxon signed-ranks test. The rank sum of audit fee differences is significant for audit fees alone (p<0.05), and for differences in audit fees adjusted for differences in size (p<0.05). This test is also performed using the natural logarithm of audit fees and size to account for the non-linear relationship between change in audit fees and change in size of the audit client firm. The results are unaffected by the alternative measures.
<table>
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<th>Increase/Decrease</th>
<th>Binomial Test</th>
<th>Wilcoxon Signed-Ranks Test</th>
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<td><strong>Change in audit fees</strong></td>
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</tr>
<tr>
<td>Auditees with Decreases</td>
<td>3</td>
<td>Rank Sum of Decreases 15</td>
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<tr>
<td>Auditees with Increases</td>
<td>112*</td>
<td>Rank Sum of Increases 6655**</td>
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<tr>
<td><strong>Change in the ratio of audit fees to size (measured by total assets)</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>Rank Sum of Decreases 1180</td>
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<tr>
<td>Auditees with Increases</td>
<td>87*</td>
<td>Rank Sum of Increases 5490**</td>
</tr>
<tr>
<td><strong>Change in the ratio of log of audit fees to log of size (measured by total assets)</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Rank Sum of Decreases 878</td>
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<tr>
<td>Auditees with Increases</td>
<td>93*</td>
<td>Rank Sum of Increases 5792**</td>
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</table>

<sup>a</sup> Change in ratio of audit fees to size is computed as:

\[
\frac{2005 \text{ Fee} - 2000 \text{ Fee}}{2005 \text{ Total Assets} - 2000 \text{ Total Assets}}
\]

<sup>b</sup> Change in ratio of log of audit fees to log of size is computed as:

\[
\frac{\log(2005 \text{ Fee}) - \log(2000 \text{ Fee})}{\log(2005 \text{ Total Assets}) - \log(2000 \text{ Total Assets})}
\]

* Significantly greater than one-half at \( p < 0.05 \) with binomial test (two-tailed).
** Significant increase at \( p < 0.05 \) with the Wilcoxon signed-ranks test (two-tailed).
4.2.4 Audit Pricing Model

In the second part of the analysis, the audit pricing model is tested to examine whether there is any significant difference in the audit fees of Second-Tier audit firms before and after SOX. The audit pricing model is also estimated using two other data sets, clients of Big-audit firms and clients of all audit firms. As indicated in Chapter 3, a significant positive value for the SOX coefficient \( \beta_1 \) of Model (2) would indicate an increase in audit fees, while a negative value would indicate a decrease in audit fees.

Table 5 reports the results of estimating Model (2) using clients of all audit firms, Second-Tier audit firms, and Big-audit firms. The indicator variable SOX is significant and positive in the three regressions. This shows that audit fees has increased for clients of Second-Tier audit firms as well as for clients for Big-audit firms. The coefficient value for the indicator variable SOX using clients of Big-audit firms (coefficient = 0.718, p-value = 0.001) is almost twice the value using clients of Second-Tier audit firms (coefficient = 0.372, p-value = 0.001). This indicates that, in general, the amount of increase in the natural log of audit fees paid by clients of Second-Tier audit firms between the pre- and post- SOX periods is about half the amount of increase in the natural log of audit fees paid by clients of Big-audit firms. Converting the natural log values to their original dollar values, the amount of increase in audit fees paid by clients of Second-Tier audit firms between the pre- and post-SOX periods is about 70 percent of the amount of increase in audit fees paid by clients of Big-audit firms with a 90 percent confidence level of 69 percent to 72 percent (see Appendix B).

Turning to the results on the determinants of audit fees using all firms data set, the audit pricing model explains 75 percent of the variation in audit fees. The coefficients of SOX, \( \ln AT \), SEGM, EMPL, INVREC, INST, FRGN, LOSS, XIDOD, and RESTAT are positively associated with audit fees as predicted at p-value < 0.01. Consistent with Whisenant et al.
TABLE 5
The Audit Pricing Model Regression Results
(Dependent variable: Natural log of audit fees)
\[
\ln FEE_{it} = \alpha + \beta_1 SOX_{it} + \beta_2 \ln TA_{it} + \beta_3 SEGM_{it} + \beta_4 EMPL_{it} + \beta_5 DA_{it} + \beta_6 CR_{it} + \\
\beta_7 INVREC_{it} + \beta_8 ROA_{it} + \beta_9 INST_{it} + \beta_{10} FRGN_{it} + \beta_{11} LOSS_{it} + \\
\beta_{12} GPM_{it} + \beta_{13} BM_{it} + \beta_{14} XIDOD_{it} + \beta_{15} ZSCORE_{it} + \beta_{16} RESTAT_{it} + \epsilon_{it} \tag{2}
\]

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<th>Predicted Sign</th>
<th>Coefficient (p-value)</th>
<th>T-statistic (p-value)</th>
<th>Coefficient (p-value)</th>
<th>T-statistic (p-value)</th>
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<td>6.887 (0.001)</td>
<td>55.15 (0.001)</td>
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<td>0.005 (0.001)</td>
<td>0.005 (0.001)</td>
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<td>3,306</td>
<td>13,963</td>
<td>304.95</td>
<td>2442.38</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td></td>
<td>3398.95</td>
<td>0.001</td>
<td>304.95</td>
<td>0.001</td>
<td>2442.38</td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td></td>
<td>75.89%</td>
<td>59.54%</td>
<td>73.68%</td>
<td>4.80 (0.001)</td>
<td>4.80 (0.001)</td>
<td>13.963</td>
</tr>
</tbody>
</table>

All Firms
Second-Tier Audit Firms
Big-Audit Firms
Definitions for all variable are as follows:

\( \ln FEE_i \) = the natural logarithm of the audit fees paid by audit client \( i \) in year \( t \) ($ actual).

\( SOX_i \) = an indicator variable that equals to 1 if audit fees are in the Post-SOX period, 0 otherwise.

\( \ln TA_i \) = the natural logarithm of total assets for audit client \( i \) in year \( t \) (first measured in $ thousands).

\( SEG\_i \) = the square root of the numbers of segments disclosed in the segment footnote for audit client \( i \) in year \( t \).

\( EMPL\_i \) = the square root of the numbers of employees (measured in thousands) disclosed in Form 10-K filing for audit client \( i \) in year \( t \).

\( DA\_i \) = total debt over total assets for audit client \( i \) in year \( t \).

\( CR\_i \) = the ratio of current assets divided by current liabilities for audit client \( i \) in year \( t \).

\( INV\_i \) = inventory plus accounts receivable, divided by total assets for audit client \( i \) in year \( t \).

\( ROA\_i \) = the return on assets, defined as operating income divided by total assets for audit client \( i \) in year \( t \).

\( INST\_i \) = the percentage of institutional holdings for audit client \( i \) in year \( t \).

\( FRGN\_i \) = an indicator variable that equals to 1 if audit client \( i \) has foreign operations in year \( t \) as indicated by the foreign currency adjustments to income, 0 otherwise.

\( LOSS\_i \) = an indicator variable that equals to 1 if audit client \( i \) reports negative net income in the previous fiscal years \( t \), 0 otherwise.

\( GPM\_i \) = the growth rate in sales for audit client \( i \) over the previous fiscal year \( t \).

\( BM\_i \) = the book-to-market ratio for audit client \( i \) in year \( t \).

\( \text{XIDOD}_i \) = absolute value of extraordinary items and discontinued operations divided by total assets for audit client \( i \) in year \( t \).

\( ZSCORE\_i \) = the one-year change in Zimjeweski’s probability of bankruptcy score (Zimjeweski, 1984) for audit client \( i \) in year \( t \).

\( RESTAT\_i \) = an indicator variable that equals to 1 if the audit client \( i \) restated assets or net income in year \( t \), 0 otherwise.
(2003) and Craswell and Francis (1999), the measure of liquidity (CR) is inversely related to audit fees. Additionally, ROA, GPM, BM, and ZSCORE are negatively associated with audit fees at p-value < 0.01. The results indicate that client size, complexity of operations, audit risk, current-year restatements, and current-year operating and stock price performance directly affect audit fees.

Table 5 also reports estimation results using Second-Tier audit firms and Big-audit firms data sets. Based on the results of Second-Tier audit firms, the audit pricing model explains 59 percent of the variation in audit fees. All coefficients are significantly related to audit fees except BM and RESTAT at p-value < 0.05. This indicates that the stock price performance and current-year restatements are not directly related to audit fees of clients of Second-Tier audit firms. One explanation for these findings is that Second-Tier audit firms do not consider the market performance of their clients when pricing their audit service.

In general, consistent with hypothesis H1, the results in this study shows that audit fees paid by clients of Second-Tier audit firms are higher in the post-2002 period compared to the pre-2002 period. However, the amount of increase in audit fees paid by clients of Second-Tier audit firms is not as high as the amount of increase in audit fees paid by clients of Big-audit firms.

The increase in audit fees paid by clients of audit fees in the post-2002 period or post-SOX is an expected occurrence. SOX is considered the most extensive securities law since the 1933 and 1934 Acts. Its main objectives are to restore investor confidence in the securities markets and to prevent future corporate frauds. SOX includes sections that directly addresses legal liability, but other aspects of SOX (e.g., the creation of the Public Company Accounting Oversight Board (PCAOB), stricter independence rules, audits of internal controls, and increased reporting responsibilities) are more important to auditors’ performance and create
new federal laws that the auditor must comply with (Messier et al. 2008). All these provisions of SOX create a new set of duties for auditors that lead to an increase in audit fees.

4.3 Results for Audit Quality of Second-Tier Audit Firms

4.3.1 Sample

The sample used in the audit quality regression models comprises all active firms in the annual database of Standard & Poor’s COMPUSTAT Industrial and Research files for the period from 2000 to 2004. The 2004 is the last year because the audit quality measure requires one year of future cash flow values, and 2005 is the last year data is available. COMPUSTAT has 9,884 active firms for each year of the study. This leads to a total of 49,420 firm-year observations. Because AuditQuality calculation is based on five annual residuals ($v$), the sample is restricted to firms with at least seven years of data (Model (3) includes both lead and lag cash flows). Firms with fewer than seven observations of residuals were deleted. This results in 19,372 firm-year observations with the required financial statement data to estimate the audit quality measure. To eliminate the effect of outliers, extreme values of the distribution are winsorized to the 1 and 99 percentiles. Around 18 percent of these observations are related to clients of Second-Tier audit firms.

4.3.2 Descriptive Statistics

Table 6 reports summary statistics on audit quality and control variables for the pooled sample. Panel A of Table 6 reports the mean and median values of the dependent variable and the control variables used in the audit quality regression analysis. The mean and median values of Audit Quality are 85.877 and 15.281, respectively, which indicates that the distribution of
TABLE 6
Descriptive Statistics of Audit Quality and Control Variables (n = 19,372)

Panel A: Dependent and independent variables descriptive statistics

<table>
<thead>
<tr>
<th>Variable Description (Names)</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>10th percentile</th>
<th>90th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variables:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit quality (AuditQuality)</td>
<td>85.877</td>
<td>216.467</td>
<td>15.281</td>
<td>0.907</td>
<td>172.612</td>
</tr>
<tr>
<td>Discretionary Accruals (</td>
<td>DACC</td>
<td>)</td>
<td>1.155</td>
<td>24.055</td>
<td>0.287</td>
</tr>
<tr>
<td><strong>Independent variables (continuous):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural log of total assets (Size)</td>
<td>5.246</td>
<td>2.558</td>
<td>5.321</td>
<td>1.249</td>
<td>8.740</td>
</tr>
<tr>
<td>Standard deviation of CFO (σ(CFO))</td>
<td>92.269</td>
<td>251.787</td>
<td>13.679</td>
<td>0.766</td>
<td>173.244</td>
</tr>
<tr>
<td>Standard deviation of sales (σ(Sales))</td>
<td>440.448</td>
<td>1,242.000</td>
<td>53.853</td>
<td>0.865</td>
<td>788.507</td>
</tr>
<tr>
<td>Natural log of operating cycle (OperCycle)</td>
<td>4.621</td>
<td>0.863</td>
<td>4.658</td>
<td>3.646</td>
<td>7.603</td>
</tr>
<tr>
<td>Negative net income (NegEarn)</td>
<td>3.259</td>
<td>2.968</td>
<td>3.000</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td><strong>Independent variables (categorical):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit firm – Second-Tier (Auditor)</td>
<td>18.34%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-SOX (Period)</td>
<td>46.43%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel B: Audit Quality by audit firm size

<table>
<thead>
<tr>
<th>Audit Quality</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>10th percentile</th>
<th>90th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second-Tier audit firms (n = 3,553)</td>
<td>9.389</td>
<td>42.386</td>
<td>1.662</td>
<td>0.392</td>
<td>59.280</td>
</tr>
<tr>
<td>Big-Audit firms (n = 15,819)</td>
<td>109.724</td>
<td>256.669</td>
<td>24.239</td>
<td>1.946</td>
<td>218.169</td>
</tr>
</tbody>
</table>

Absolute Value of Discretionary Accruals

<table>
<thead>
<tr>
<th>Audit Quality</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>10th percentile</th>
<th>90th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second-Tier audit firms (n = 3,801)</td>
<td>3.598</td>
<td>42.705</td>
<td>0.400</td>
<td>0.082</td>
<td>3.194</td>
</tr>
<tr>
<td>Big-Audit firms (n = 15,947)</td>
<td>0.361</td>
<td>1.668</td>
<td>0.263</td>
<td>0.048</td>
<td>0.737</td>
</tr>
</tbody>
</table>

*a Definitions for all variables are as follows:

Auditor\_jt\_ = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm;

Period\_jt\_ = indicator variable that equals 1 if the audit period is equal or post-2002 and 0 if the audit period is pre-2002;

AuditQuality\_jt\_ = standard deviation of firm j’s residuals (\( \sigma \)), calculated over a five years period (\( t-4 \)) through \( t \) using the Dechow and Dichev (2002) model; |DACC\_| = absolute value of discretionary accruals estimated
using the modified Jones (1991) model; $Size_j = \text{firm size measured as the natural log of total assets in year } t$; 
$\sigma(CFO)_j = \text{standard deviation of firm } j\text{'s CFO, calculated over the past 10 years}$; 
$\sigma(Sales)_j = \text{standard deviation of firm } j\text{'s sales revenue, calculated over the past 10 years}$; 
$\text{OperCycle}_j = \text{natural log of firm } j\text{'s operating cycle, measured as the sum of days accounts receivable and days inventory}$; and 
$\text{NegEarn}_j = \text{number of years, out of the past 10 years, where firm } j\text{ reported net income before extraordinary items less than zero}$.
Audit Quality is skewed to the right. Same observation is also noticed for the standard deviation of cash flows (\(\sigma(CFO)\)) and the standard deviation of sales (\(\sigma(Sales)\)).

Panel B of Table 6 reports the mean and median values of Audit Quality by the size of the audit firm. The mean and the median values for Audit Quality for Second-Tier (Big-) audit firms are 9.389 (109.724) and 1.662 (24.239) respectively. These univariate results show that, on average, the audit quality provided by Second-Tier audit firms is higher than the audit quality provided by Big-audit firms. Since these results are inconsistent with previous research that shows that Big-audit firms provide higher audit quality (e.g., Blokdijk et al. 2006; Defond and Francis 2005; Jensen and Payne 2005), it is important to control for other factors that may affect the audit quality measure. Other factors include clients’ size, variation in cash flows, variation in sales revenue, length of the operating cycle, and operating income and loss.

Table 7 presents Pearson and Spearman correlations between Audit Quality and the variables used in the analysis of the audit quality model. Numbers above the diagonal represent Pearson correlations, while numbers below the diagonal represent Spearman correlations. The dependent variable Audit Quality and the independent variables Size, \(\sigma(CFO)\), and \(\sigma(Sales)\) are strongly positively correlated (Pearson correlations = 0.56, 0.86, 0.75; Spearman correlations = 0.90, 0.91, 0.87, respectively). However, all remaining independent variables are negatively correlated with Audit Quality.

There are consistent high correlations between the three independent variables Size, \(\sigma(CFO)\), and \(\sigma(Sales)\). However, the VIF for these three variables in the regression analysis indicates that the analysis is free from multicollinearity problem.
**TABLE 7**

**Correlation Coefficients for Audit Quality and Control Variables (n = 19,372)**

<table>
<thead>
<tr>
<th></th>
<th>AuditQuality</th>
<th>Auditor</th>
<th>Period</th>
<th>Size</th>
<th>(\sigma(CFO))</th>
<th>(\sigma(Sales))</th>
<th>OperCycle</th>
<th>NegEarn</th>
</tr>
</thead>
<tbody>
<tr>
<td>AuditQuality</td>
<td>-</td>
<td>-0.18</td>
<td>-0.03</td>
<td>0.56</td>
<td>0.86</td>
<td>0.75</td>
<td>-0.02</td>
<td>-0.19</td>
</tr>
<tr>
<td>Auditor</td>
<td>-0.50</td>
<td>-</td>
<td>-</td>
<td>-0.55</td>
<td>-0.16</td>
<td>-0.16</td>
<td>0.06</td>
<td>0.29</td>
</tr>
<tr>
<td>Period</td>
<td>-0.08</td>
<td>-</td>
<td>-</td>
<td>0.11</td>
<td>-0.02</td>
<td>-0.01</td>
<td>-0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Size</td>
<td>0.90</td>
<td>-0.54</td>
<td>0.72</td>
<td>-</td>
<td>0.52</td>
<td>0.53</td>
<td>-0.10</td>
<td>-0.55</td>
</tr>
<tr>
<td>(\sigma(CFO))</td>
<td>0.91</td>
<td>-0.49</td>
<td>0.79</td>
<td>0.87</td>
<td>-</td>
<td>0.74</td>
<td>-0.4</td>
<td>-0.15</td>
</tr>
<tr>
<td>(\sigma(Sales))</td>
<td>0.87</td>
<td>-0.48</td>
<td>0.74</td>
<td>0.92</td>
<td>0.85</td>
<td>-</td>
<td>-0.07</td>
<td>-0.23</td>
</tr>
<tr>
<td>OperCycle</td>
<td>-0.04</td>
<td>0.06</td>
<td>0.07</td>
<td>-0.12</td>
<td>-0.12</td>
<td>-0.16</td>
<td>-</td>
<td>0.06</td>
</tr>
<tr>
<td>NegEarn</td>
<td>-0.39</td>
<td>0.29</td>
<td>-0.21</td>
<td>-0.56</td>
<td>-0.29</td>
<td>-0.52</td>
<td>0.06</td>
<td>-</td>
</tr>
</tbody>
</table>

Pearson coefficients above the diagonal line and Spearman coefficients below the line. p-values shown below correlation coefficients.

Definitions for all variables are as follows:

- **AuditQuality** = standard deviation of firm \(j\)’s residuals (\(\epsilon\)), calculated over a five years period (\(t-4\)) through \(t\) using the Dechow and Dichev (2002) model;
- **Auditor** = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big audit firm;
- **Period** = indicator variable that equals 1 if the audit period is equal or post-2002 and 0 if the audit period is pre-2002;
- **Size** = firm size measured as the natural log of total assets in year \(t\);
- **\(\sigma(CFO)\)** = standard deviation of firm \(j\)’s CFO, calculated over the past 10 years;
- **\(\sigma(Sales)\)** = standard deviation of firm \(j\)’s sales revenue, calculated over the past 10 years;
- **OperCycle** = natural log of firm \(j\)’s operating cycle, measured as the sum of days accounts receivable and days inventory; and
- **NegEarn** = number of years, out of the past 10 years, where firm \(j\) reported net income before extraordinary items less than zero.
4.3.3 Audit Quality and Audit Firm

The second set of hypotheses H2a and H2b examines whether Audit Quality provided by Second-Tier audit firms to their clients is lower than the Audit Quality provided by Big-audit firms, and whether the audit quality provided by Second-Tier audit firms has declined in the post-SOX period. Evidence on the difference between audit quality provided by Second-Tier audit firms and Big-audit firms is detailed in Table 8, where the results of Model (4) are presented with two specifications. The first column of Table 8 shows the result of Model (4) without including the auditor indicator variable (Auditor). The model is highly significant yielding an adjusted $R^2$ of 78.36 percent. All independent variables in Model (4) are significant and have positive coefficients as predicted. One interesting finding is the association between (AuditQuality) and the control variable (Size). The coefficient for the variable (Size) is significant and positive (coefficient = 9.916, p-value = 0.001). This finding supports the expectation that the larger the size of the client firm, the higher the variability in accruals as measured by the Dechow and Dichev (2002) measure of standard deviation of abnormal accruals.\(^\text{13}\) The coefficient values of the independent variables for the sample used in this regression (2002–2004) are similar to those reported by Dechow and Dichev (2002) for their sample (1987–1999) and those reported by Francis et al. (2005) for their sample of (1970–2001).

The second column of Table 8 shows the result of Model (4) with the auditor indicator variable (Auditor) included in the model. The model is also highly significant yielding an adjusted $R^2$ of 78.43 percent. The second row shows the coefficient estimates, t-statistics, and p-value for the variable of interest (Auditor). As expected, the results of Model (4) support

\(^{13}\) Audit quality is measured as the standard deviation of residuals in the Dechow and Dichev (2002) model. Larger standard deviations of residuals indicate poorer audit quality.
Table 8
Audit Quality and Audit Firm Regression Results
(Dependent variable: Audit quality measure)

\[
AuditQuality_{jt} = \phi_0 + \phi_1 Auditor_{jt} + \phi_2 Size_{jt} + \phi_3 \sigma(CFO)_{jt} + \phi_4 \sigma(Sales)_{jt} + \phi_5 OperCycle_{jt} + \phi_6 NegEarn_{jt} + \mu_{jt}
\] (4)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Predicted Sign</th>
<th>Coefficient</th>
<th>T-statistic (p-value)</th>
<th>Coefficient</th>
<th>T-statistic (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>?</td>
<td>-74.556</td>
<td>-15.21 (0.001)</td>
<td>-87.028</td>
<td>-16.84 (0.001)</td>
</tr>
<tr>
<td>Auditor</td>
<td>+</td>
<td>16.272</td>
<td>7.55 (0.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>+</td>
<td>9.916</td>
<td>24.19 (0.001)</td>
<td>11.717</td>
<td>24.73 (0.001)</td>
</tr>
<tr>
<td>(\sigma(CFO))</td>
<td>+</td>
<td>0.555</td>
<td>123.56 (0.001)</td>
<td>0.552</td>
<td>122.70 (0.001)</td>
</tr>
<tr>
<td>(\sigma(Sales))</td>
<td>+</td>
<td>0.038</td>
<td>42.20 (0.001)</td>
<td>0.037</td>
<td>41.39 (0.001)</td>
</tr>
<tr>
<td>OperCycle</td>
<td>+</td>
<td>7.834</td>
<td>9.28 (0.001)</td>
<td>7.777</td>
<td>9.23 (0.001)</td>
</tr>
<tr>
<td>NegEarn</td>
<td>+</td>
<td>1.313</td>
<td>4.39 (0.001)</td>
<td>1.419</td>
<td>4.74 (0.001)</td>
</tr>
</tbody>
</table>

Number of observations: 19,372

Model F-statistic: 14,032.7 (0.001)

Model Adjusted R\(^2\): 78.36%

---

\(a\) Definitions for all variables are as follows:

- \(AuditQuality_{jt}\) = standard deviation of firm \(j\)'s residuals (\(\sigma\)), calculated over a five years period (\(t-4\) through \(t\)) using the Dechow and Dichev (2002) model;
- \(Auditor_{jt}\) = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm;
- \(Size_{jt}\) = firm size measured as the natural log of total assets in year \(t\);
- \(\sigma(CFO)_{jt}\) = standard deviation of firm \(j\)'s CFO, calculated over the past 10 years;
- \(\sigma(Sales)_{jt}\) = standard deviation of firm \(j\)'s sales revenue, calculated over the past 10 years;
- \(OperCycle_{jt}\) = natural log of firm \(j\)'s operating cycle, measured as the sum of days accounts receivable and days inventory; and
- \(NegEarn_{jt}\) = number of years, out of the past 10 years, where firm \(j\) reported net income before extraordinary items less than zero.
hypothesis H2a, where the auditor indicator variable (Auditor) is significant and positive (coefficient = 16.272, p-value = 0.001). This indicates that the audit quality provided by Big-audit firms to their clients is higher than the audit quality provided by Second-Tier audit firms. All other control variables used in Model (4) are significant and have positive coefficients as predicted.

Table 9 presents the results of Model (5) presented with two specifications. Firms audited by Second-tier audit firms are only used in the analysis.\textsuperscript{14} This reduced the number of observations to 5,137 observations. The first column of Table 9 shows the result of Model (5) without including the indicator variable (Period). The model is highly significant yielding an adjusted $R^2$ of 79.13 percent. All independent variables in Model (5) are significant and have positive coefficients as predicted. Similar to Model (4), the coefficient for the variable (Size) is significant and positive (coefficient = 2.288, p-value = 0.001), which indicates a negative association between the size of the client firm and the audit quality provided for clients of Second-Tier audit firms. This result shows that small client firms receive better audit quality than big client firms in the period of this study (2000-2004).

The second column of Table 9 shows the result of Model (5) with the indicator variable (Period) included in the model. The indicator variable (Period) equals 1 if the audit period is equal or post-2002 and 0 if the audit period is pre-2002. The results of Model (5) fail to support hypothesis H2b. The indicator variable (Period) is positive but not significant (coefficient = 0.265, p-value = 0.522). This shows that the change in the audit quality provided to clients of Second-Tier audit firms is not significant in the post-SOX period. One possible explanation to this finding is that the quality of audits provided by Second-Tier audit firms has

\textsuperscript{14} For consistency across client firms, year 2004 is used to determine whether the audit firm is a Second-Tier audit firm or a Big-audit firm. All clients audited by Big-audit firms in year 2004 are excluded from the sample used in Model 5.
TABLE 9
Audit Quality and SOX Period Regression Results for Second-Tier Audit Firms
(Dependent variable: Audit quality measure)

\[
AuditQuality_{jt} = \phi_0 + \phi_1 Period_{jt} + \phi_2 Size_{jt} + \phi_3 \sigma(CFO)_{jt} + \phi_4 \sigma(Sales)_{jt} + \phi_5 OperCycle_{jt} + \phi_6 NegEarn_{jt} + \mu_{jt}
\]  

<table>
<thead>
<tr>
<th>Independent Variables (^a)</th>
<th>Predicted Sign</th>
<th>Coefficient</th>
<th>T-statistic ((p)-value)</th>
<th>Standard Deviation of Residuals (\sigma(\mu))</th>
<th>Coefficient</th>
<th>T-statistic ((p)-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>?</td>
<td>-6.571</td>
<td>-6.20 (0.001)</td>
<td>-6.677</td>
<td>-6.22</td>
<td>(0.001)</td>
</tr>
<tr>
<td>Period</td>
<td>+</td>
<td></td>
<td></td>
<td>0.265 0.64</td>
<td>(0.522)</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>+</td>
<td>2.288</td>
<td>19.78 (0.001)</td>
<td>2.922 19.79</td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>(\sigma(CFO))</td>
<td>+</td>
<td>0.430</td>
<td>65.60 (0.001)</td>
<td>0.430 65.59</td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>(\sigma(Sales))</td>
<td>+</td>
<td>0.035</td>
<td>23.54 (0.001)</td>
<td>0.035 23.52</td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>OperCycle</td>
<td>+</td>
<td>0.736</td>
<td>3.98 (0.001)</td>
<td>0.742 4.00</td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>NegEarn</td>
<td>+</td>
<td>0.009</td>
<td>0.14 (0.891)</td>
<td>0.009 0.12</td>
<td>(0.904)</td>
<td></td>
</tr>
</tbody>
</table>

Number of observations 5,138 5,138
Model 3,897.19 3,247.35
F-statistic (0.001) (0.001)
Model Adjusted \(R^2\) 79.13% 79.13%

\(^a\) Definitions for all variables are as follows:

\(AuditQuality_{jt}\) = standard deviation of firm \(j\)'s residuals \((\sigma)\), calculated over a five years period \((t-4)\) through \(t\) using the Dechow and Dichev (2002) model;

\(Period_{jt}\) = indicator variable that equals 1 if the audit period is equal or post-2002 and 0 if the audit period is pre-2002;

\(Size_{jt}\) = firm size measured as the natural log of total assets in year \(t\);

\(\sigma(CFO)_{jt}\) = standard deviation of firm \(j\)'s CFO, calculated over the past 10 years;

\(\sigma(Sales)_{jt}\) = standard deviation of firm \(j\)'s sales revenue, calculated over the past 10 years;

\(OperCycle_{jt}\) = natural log of firm \(j\)'s operating cycle, measured as the sum of days accounts receivable and days inventory; and

\(NegEarn_{jt}\) = number of years, out of the past 10 years, where firm \(j\) reported net income before extraordinary items less than zero.
not changed significantly in the post-SOX period because Second-Tier audit firms need to sustain the level of audit quality in an effort to increase their market share.

One other finding worth noting is that the variable \( \text{NegEarn} \) is insignificantly related to audit quality in Model (5) (coefficient = 0.008, p-value = 0.904). This indicates that whether a client firm is profitable or not is not a significant variable to the level of audit quality provided.

Table 10 presents the results of Model (6). Model (6) further investigates the effect of audit fees on audit quality. The first column of Table 10 shows the result of Model (6) using a sample of clients of both Big-audit firms and Second-Tier audit firms. The model is highly significant yielding an adjusted \( R^2 \) of 78.79 percent. The independent variable of interest \( (\ln FEE) \) is positive and significant (coefficient = 3.084, p-value = 3.56). This shows that there is a negative association between audit fees and the audit quality provided. All other independent variables in Model (6) are significant and have positive coefficients as predicted. This finding supports previous results in Model (4) and Model (5) which confirms the negative association between the size of the client firm and the audit quality provided. This result indicates that small client firms receive better audit quality than big client firms for the sample of firms used in this study.

The second column of Table 10 shows the result of Model (6) using a sample of clients of Second-Tier audit firms only. The results are similar to the previous results using clients of all audit firms. The model is also highly significant yielding a higher adjusted \( R^2 \) of 83.93 percent. The indicator variable \( (\ln FEE) \) is positive and significant (coefficient = 1.754, p-value = 7.43). This shows that, even for clients of Second-Tier audit firms, there is a negative association between audit fees and the audit quality provided by audit firms. One plausible explanation to this finding is that audit fees are generally higher for more complex types of
TABLE 10
Audit Quality and Audit Fees Regression Results
(Dependent variable: Audit quality measure)

\[ AuditQuality_{jt} = \beta_0 + \beta_1 \ln FEE_{jt} + \beta_2 \text{Size}_{jt} + \beta_3 \sigma(CFO)_{jt} + \beta_4 \sigma(Sales)_{jt} + \beta_5 \text{OperCycle}_{jt} + \beta_6 \text{NegEarn}_{jt} + \mu_{jt} \]  \hspace{1cm} (6)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Predicted Sign</th>
<th>Coefficient All Firms</th>
<th>T-statistic (p-value)</th>
<th>Coefficient Second-Tier Audit Firms</th>
<th>T-statistic (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>?</td>
<td>-109.220</td>
<td>-11.16 (0.001)</td>
<td>-27.734 (0.001)</td>
<td></td>
</tr>
<tr>
<td>inFEE</td>
<td>?</td>
<td>3.084</td>
<td>3.56 (0.001)</td>
<td>1.754 (0.001)</td>
<td>7.43 (0.001)</td>
</tr>
<tr>
<td>Size</td>
<td>+</td>
<td>8.017</td>
<td>13.29 (0.001)</td>
<td>1.732 (0.001)</td>
<td>11.53 (0.001)</td>
</tr>
<tr>
<td>(\sigma(CFO))</td>
<td>+</td>
<td>0.553</td>
<td>123.70 (0.001)</td>
<td>0.480 (0.001)</td>
<td>83.21 (0.001)</td>
</tr>
<tr>
<td>(\sigma(Sales))</td>
<td>+</td>
<td>0.036</td>
<td>43.61 (0.001)</td>
<td>0.030 (0.001)</td>
<td>24.95 (0.001)</td>
</tr>
<tr>
<td>OperCycle</td>
<td>+</td>
<td>8.494</td>
<td>10.25 (0.001)</td>
<td>1.115 (0.001)</td>
<td>6.32 (0.001)</td>
</tr>
<tr>
<td>NegEarn</td>
<td>+</td>
<td>0.967</td>
<td>3.49 (0.001)</td>
<td>-0.066 (0.293)</td>
<td>-1.05 (0.293)</td>
</tr>
</tbody>
</table>

Number of observations: 16,119, 3,937

Model F-statistic: 9,978.80 (0.001), 3,426.22 (0.001)
Model Adjusted R²: 78.79%, 83.93%

* Definitions for all variables are as follows:
  
  \(AuditQuality_{jt}\) = standard deviation of firm \(j\)'s residuals (\(U\)), calculated over a five years period \((t-4)\) through \(t\) using the Dechow and Dichev (2002) model;
  
  \(\ln FEE_{jt}\) = natural logarithm of the audit fees paid by audit client \(i\) in year \(t\) ($ actual);
  
  \(\text{Size}_{jt}\) = firm size measured as the natural log of total assets in year \(t\);
  
  \(\sigma(CFO)_{jt}\) = standard deviation of firm \(j\)'s CFO, calculated over the past 10 years;
  
  \(\sigma(Sales)_{jt}\) = standard deviation of firm \(j\)'s sales revenue, calculated over the past 10 years;
  
  \(\text{OperCycle}_{jt}\) = natural log of firm \(j\)'s operating cycle, measured as the sum of days accounts receivable and days inventory; and
  
  \(\text{NegEarn}_{jt}\) = number of years, out of the past 10 years, where firm \(j\) reported net income before extraordinary items less than zero.
client firms. Due to their clients’ complexity, audit firms fail to provide high audit quality for their audit services, even though they have to charge higher audit fees.

In sum, the results show that audit quality provided by Second-Tier audit firms is lower than the audit quality provided by Big-audit firms, which supports hypothesis H2a. However, the results do not support H2b, where the audit quality provided by Second-Tier audit has not changed in the post-SOX period when compared to the pre-SOX period. Additional investigation also indicates that there is a negative association between audit fees and the audit quality provided by audit firms.

4.4 Results for Cost of Capital

4.4.1 Sample

The sample used in the cost of capital regression models (both cost of debt and cost of equity) comprises the intersection of (1) all active firms in the annual database of Standard & Poor’s COMPUSTAT Industrial and Research files, (2) I/B/E/S, and (3) Center for Research and Security Prices (CRSP) for the period from 2000 to 2004. The 2004 is the last year because the audit quality measure is calculated up to 2004. As in previous sections, extreme values of the distribution are winsorized to the 1 and 99 percentiles to eliminate the effect of outliers.

4.4.2 Descriptive Statistics

Table 1 provides summary information of descriptive statistics for cost of capital and control variables used in Models (7) and (8). Panel A provides information on the cost of debt. The mean and median values for cost of debt are 7.722 and 6.544, respectively. In Panel B of Table 11 descriptive statistics for cost of equity measures are presented. The GM measure,
### TABLE 11
Descriptive Statistics of Cost of Capital and Control Variables

<table>
<thead>
<tr>
<th>Panel A: Cost of debt (n = 5,520)</th>
<th>Second-Tier firms = 9.47%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable Description (Names)</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td><strong>Dependent Variable:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Independent variables (continuous):</strong></td>
<td></td>
</tr>
<tr>
<td>Audit quality (AuditQuality)</td>
<td>69.805</td>
</tr>
<tr>
<td>Natural log of leverage (ln(Leverage))</td>
<td>-1.725</td>
</tr>
<tr>
<td>Natural log of TA (Size)</td>
<td>6.609</td>
</tr>
<tr>
<td>Return on assets (ROA)</td>
<td>-1.500</td>
</tr>
<tr>
<td>Interest coverage (IntCov)</td>
<td>0.087</td>
</tr>
<tr>
<td>Standard Deviation of NII (σ(NIBE))</td>
<td>0.121</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Cost of equity (n = 4,289)</th>
<th>Second-Tier firms = 6.59%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable Description (Names)</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td><strong>Dependent Variable:</strong></td>
<td></td>
</tr>
<tr>
<td>Cost of equity (PEG)</td>
<td>11.875</td>
</tr>
<tr>
<td>Cost of equity (GM)</td>
<td>12.802</td>
</tr>
<tr>
<td>Cost of equity (CT)</td>
<td>10.414</td>
</tr>
<tr>
<td><strong>Independent variables (continuous):</strong></td>
<td></td>
</tr>
<tr>
<td>Audit quality (AuditQuality)</td>
<td>65.917</td>
</tr>
<tr>
<td>Natural log of leverage (ln(Leverage))</td>
<td>-2.029</td>
</tr>
<tr>
<td>Natural log of TA (Size)</td>
<td>6.784</td>
</tr>
<tr>
<td>Systematic risk (BETA)</td>
<td>0.948</td>
</tr>
<tr>
<td>Earnings variability (VAR)</td>
<td>0.104</td>
</tr>
<tr>
<td>Natural log of B/M ratio (ln(B/M))</td>
<td>-0.805</td>
</tr>
<tr>
<td>Forecasted growth (Growth)</td>
<td>0.297</td>
</tr>
</tbody>
</table>

a Definitions for all variables are as follows:

- CostDebt = firm j’s ratio of interest expense to interest-bearing debt in year t; CostEquity = firm j’s measure of cost of capital in year t based on Easton (2004) measure; CostEquity = firm j’s measure of cost of capital in year t based on Gebhardt et al. (2003); CostEquity (GLS) = firm j’s measure of cost of capital in year t based on Gebhardt et al. (2001) measure; CostEquity (CT) = firm j’s measure of cost of capital in year t based on Claus and Thomas (2001) measure; CostEquity = standard deviation of firm j’s residuals (U), calculated over a five years period (t–4) through t using the Dechow and Dichev (2002) model; ln(Leverage) = natural log of firm j’s ratio of interest bearing debt to total assets in year t; Size = natural log of firm j’s total assets in year t; ROA = firm j’s return on assets in year t; IntCov = firm j’s ratio of operating income to interest expense in year t; σ(NIBE) = standard deviation of firm j’s net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period; five observations of NIBE at least are required to calculate the standard deviation; BETA = stock beta (systematic risk) calculated over 60 months ending in the month of the fiscal-year-end; VAR = earnings variability of firm j measured by the dispersion in analysts’ earnings forecasts available on I/B/E/S database during the fiscal year-end t; ln(B/M) = natural log of firm j’s ratio of book value of equity to market value of equity as of fiscal year-end t; and Growth = forecasted growth of firm j measured as the difference between the mean analysts’ two and one-year ahead earnings forecast scaled by the one-year ahead earnings forecast.
<table>
<thead>
<tr>
<th></th>
<th>CostDebt</th>
<th>Auditor</th>
<th>AuditQuality</th>
<th>Ln(Leverage)</th>
<th>Size</th>
<th>ROA</th>
<th>IntCov</th>
<th>σ(NIBE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Cost of debt (n = 5,520)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CostDebt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auditor</td>
<td>-0.02</td>
<td>-0.06</td>
<td>-0.22</td>
<td>-0.09</td>
<td>0.21</td>
<td>-0.04</td>
<td>-0.01</td>
<td>-0.09</td>
</tr>
<tr>
<td>AuditQuality</td>
<td>-0.10</td>
<td>-0.03</td>
<td>0.11</td>
<td>0.69</td>
<td>0.07</td>
<td>0.01</td>
<td>-0.06</td>
<td></td>
</tr>
<tr>
<td>Ln(Leverage)</td>
<td>-0.01</td>
<td>0.17</td>
<td>-</td>
<td>0.22</td>
<td>-0.07</td>
<td>-0.16</td>
<td>-0.04</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>-0.17</td>
<td>-0.11</td>
<td>0.24</td>
<td>-</td>
<td>0.27</td>
<td>0.07</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>-0.19</td>
<td>-0.22</td>
<td>0.21</td>
<td>-</td>
<td>0.21</td>
<td>-0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IntCov</td>
<td>-0.23</td>
<td>-0.40</td>
<td>0.18</td>
<td>0.83</td>
<td>-</td>
<td>0.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>σ(NIBE)</td>
<td>-0.12</td>
<td>-0.27</td>
<td>-0.15</td>
<td>-0.49</td>
<td>-0.34</td>
<td>-0.32</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

|                  |          |         |              |              |        |        |        |         |
| **Panel B: Cost of equity (n = 6,695)** |          |         |              |              |        |        |        |         |
| PEG              | -0.961   |         | -0.010       | 0.175        |        |        |        |         |
| GM               |          | 0.001   |              |              |        |        |        |         |
| GLS              | -0.013   |         |              |              |        |        |        |         |
| CT               | 0.213    |         |              |              |        |        |        |         |

Pearson coefficients above the diagonal line and Spearman coefficients below the line. 
p-values shown below correlation coefficients.

Definitions for all variables are as follows:

- **CostDebt** = firm j’s ratio of interest expense to interest-bearing debt in year t;
- **CostEquity** = firm j’s measure of cost of capital in year t;
- **IntCov** = firm j’s ratio of operating income to interest expense in year t;
- **σ(NIBE)** = standard deviation of firm j’s net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period; five observations of NIBE at least are required to calculate the standard deviation.
which is based on Gode and Mohanram (2003) method of measuring cost of capital, has the highest mean and median values. The mean and median values for GM are 12.802 and 11.512, respectively. The lowest measures for cost of capital are for the GLS measure, which is based on Gebhardt et al. (2001) method of measuring cost of capital. The mean and median values for GLS are 9.149 and 9.227. Other descriptive statistics for the control variables applied in Model (6) are presented in Panel B of Table 11.

Table 12 presents Pearson and Spearman correlations for the cost of capital measures and control variables used in Models (7) and (8). Numbers above the diagonal represent Pearson correlations, while numbers below the diagonal represent Spearman correlations. Panel A of Table 12 presents the correlation coefficients for cost of debt and independent variable of Models (7) and (8). The correlation between all the variables is considerably low with the exception of AuditQuality and Size. Panel B presents the correlation coefficients between the four measures of cost of equity. There is a high significant positive correlation between PEG and GM. This indicates that there could be a possible similarity between the results of these two measures.

### 4.4.3 Results for Cost of Debt

Table 13 reports the results of estimating Model (7). Overall, the model is significant yielding an adjusted $R^2$ of 16.31 percent. The second and third rows show the coefficient estimates, t-statistics, and p-values for the two variables of interest, Auditor and AuditQuality.

As expected, the variable Auditor is significantly positively correlated to CostDebt (coefficient = 0.160, p-value = 0.001), suggesting that clients of Second-Tier audit firms incur higher cost of debt by their creditors when compared to clients of Big-audit firms. Similarly, AuditQuality is significantly positively correlated to CostDebt (coefficient = 0.004, p-value = 0.001), which
suggest that creditors pay attention to the level of audit quality provided by the audit firm in their determination of the cost of debt. Therefore, clients of audit firms with poor audit quality incur higher cost of debt. Bear in mind that higher values for the \emph{AuditQuality} variable indicate lower quality of audit. The results for the control variables are also significant, except for \emph{IntCov} and $\sigma(\text{NIBE})$. $\sigma(\text{NIBE})$ is marginally significant (at the 10 percent level or better) but has an opposite sign to what is predicted. \ln(\text{Leverage}) is significant but negatively related to \emph{CostDebt} (coefficient = -3.401, p-value = 0.001).\footnote{Francis et al. (2005), and Pittman and Fortin (2004) indicate that leverage is a noisy proxy for the cost of debt. Truncation at the 5\textsuperscript{th} and 95\textsuperscript{th} percentiles could lead to a significant positive coefficient for leverage.}

As a rule of thumb, according to Kennedy (1998), a VIF that is larger than 10 indicates harmful multicolinearity. In addition, a Durbin-Watson statistic that is less than 2 is an indicator of autocorrelation problem. The VIF, the Durbin-Watson, and the first order autocorrelation values in the regression analyses of Model (7) indicate that the analyses are free from econometrical problems. Model (7) results have VIF values that are less than 3 and Durbin-Watson statistics around 2.

In summary, the above findings support hypothesis H3a, where it shows that clients of Second-Tier audit firms incur cost of debt that is higher than the cost of debt incurred by clients of Big-audit firms. One apparent explanation for this finding is that the audit quality provided by the audit firm has a direct effect on the cost of debt. As audit quality provided by Big-audit firms to their clients is higher than the audit quality provided by Second-Tier audit firms, it could be reasonable to state that creditors expect lower cost of debt for clients of Big-audit firms than they expect for clients of Second-Tier audit firms.
TABLE 13
Cost of Debt Regression Results

(Dependent variable: Cost of debt)

\[ \text{CostDebt}_t = \phi_0 + \phi_1 \text{Auditor}_t + \phi_2 \text{AuditQuality}_t + \phi_3 \ln(\text{Leverage})_t + \phi_4 \text{Size}_t + \phi_5 \text{ROA}_t + \phi_6 \text{IntCov}_t + \phi_7 \sigma(\text{NIBE})_t + \mu_t \] (7)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Predicted Sign</th>
<th>Coefficient</th>
<th>T-statistic (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>4.017</td>
<td>4.41 (0.001)</td>
</tr>
<tr>
<td>Auditor</td>
<td>+</td>
<td>0.160</td>
<td>3.11 (0.001)</td>
</tr>
<tr>
<td>AuditQuality</td>
<td>+</td>
<td>0.004</td>
<td>2.30 (0.021)</td>
</tr>
<tr>
<td>\ln(\text{Leverage})</td>
<td>+</td>
<td>-3.401</td>
<td>-26.70 (0.001)</td>
</tr>
<tr>
<td>Size</td>
<td>-</td>
<td>-0.390</td>
<td>-3.32 (0.001)</td>
</tr>
<tr>
<td>ROA</td>
<td>-</td>
<td>-0.070</td>
<td>-13.45 (0.001)</td>
</tr>
<tr>
<td>IntCov</td>
<td>-</td>
<td>-0.056</td>
<td>-0.24 (0.807)</td>
</tr>
<tr>
<td>\sigma(\text{NIBE})</td>
<td>+</td>
<td>-0.559</td>
<td>-1.80 (0.058)</td>
</tr>
</tbody>
</table>

Number of observations: 5,520
Model: 154.68
F-statistic: (0.001)

Model: Adjusted R² = 16.31%

Definitions for all variables are as follows:

CostDebt<sub>_t</sub> = firm <i>j</i>’s ratio of interest expense to interest-bearing debt in year <i>t</i>; Auditor<sub>_t</sub> = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm; AuditQuality = standard deviation of firm <i>j</i>’s residuals (<i>U</i>), calculated over a five years period (<i>t</i>–4) through <i>t</i> using the Dechow and Dichev (2002) model; \ln(\text{Leverage})<sub>_t</sub> = natural log of firm <i>j</i>’s ratio of interest bearing debt to total assets in year <i>t</i>; Size<sub>_t</sub> = natural log of firm <i>j</i>’s total assets in year <i>t</i>; ROA<sub>_t</sub> = firm <i>j</i>’s return on assets in year <i>t</i>; IntCov<sub>_t</sub> = firm <i>j</i>’s ratio of operating income to interest expense in year <i>t</i>; \sigma(\text{NIBE})<sub>_t</sub> = standard deviation of firm <i>j</i>’s net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period; five observations of NIBE at least are required to calculate the standard deviation.
4.4.4 Results for Cost of Equity

Panel A of Table 14 presents the regressions results of estimating Model (8) using pooled data. These regressions examine whether Second-Tier audit firms are associated with a higher cost of equity for their clients, and whether the audit quality provided by audit firms is associated with the cost of equity of their clients. Model (8) applies four methods of measuring cost of equity. These measures are based on Easton (2004), Gode and Mohanram (2003), Gebhardt et al. (2001), and Claus and Thomas (2001).\(^{16}\) The PEG and the GM cost of equity based regressions have the highest \(R^2\) values (22.93 percent and 19.90 percent, respectively). The GLS based regression has the lowest \(R^2\) value (3.49 percent). In the regressions, all control variables (\(ln(\text{Leverage})\), Size, BETA, VAR, \(ln(B/M)\), and Growth) are significantly associated with the cost of equity with the expected signs for three of the cost of equity measures: PEG, GM, and CT.\(^{17}\) The GLS measure of cost of equity is not associated with the control variables except for BETA. The main interest is whether clients of Second-Tier audit firms pay higher cost of equity compared to clients of Big-audit firms. Hence, the study focuses on the indicator variable (Auditor). If investors perceive Second-Tier audit firms to be providing a lower quality audit (relative to Big-audit firms), then firms audited by Second-Tier audit firms should be perceived as having higher risk and thus should have a higher cost of capital. The variable of interest (Auditor) is not significant with the cost of equity in the PEG and the GM based models (coefficient = -0.017, 0.021; p-value = 0.528, 0.455, respectively). The GLS and the CT based models show positive and significant estimates for the variable (Auditor) (coefficient = 0.050, 0.126; p-value = 0.011, 0.004, respectively). On the other hand,\(^{16}\) The four measures of cost of equity are abbreviated as PEG, GM, GLS, and CT for the four studies of Easton (2004), Gode and Mohanram (2003), Gebhardt et al. (2001), and Claus and Thomas (2001) respectively.\(^{17}\) Khurana and Raman (2004), applying the PEG approach for cost of equity only, showed the cost of equity estimates are associated with the traditional risk measures in the expected direction.
TABLE 14
Cost of Equity Regressions Results

(Independent variables: Cost of equity measures)\textsuperscript{a}

\[
CostEquity_{it} = \phi_0 + \phi_1 \text{Auditor}_{jt} + \phi_2 \text{AuditQuality}_{jt} + \phi_3 \ln(\text{Leverage})_{jt} + \phi_4 \text{Size}_{jt} + \phi_5 \text{BETA}_{jt} + \phi_6 \text{VAR}_{jt} + \phi_7 \ln(B/M)_{jt} + \phi_8 \text{Growth}_{jt} + \mu_{jt}
\]

(8)

Panel A: Results of pooled data regression

<table>
<thead>
<tr>
<th>CostEquity Measure\textsuperscript{b}</th>
<th>Intercept \textsuperscript{(?)}</th>
<th>Auditor \textsuperscript{(+)}</th>
<th>AuditQuality \textsuperscript{(+)}</th>
<th>\ln(Leverage) \textsuperscript{(+)}</th>
<th>Size \textsuperscript{(-)}</th>
<th>BETA \textsuperscript{(+)}</th>
<th>VAR \textsuperscript{(+)}</th>
<th>\ln(B/M) \textsuperscript{(+)}</th>
<th>Growth \textsuperscript{(+)}</th>
<th>Adjusted \textsuperscript{R\textsuperscript{2}}</th>
<th>F Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEG</td>
<td>19.515 (0.001)</td>
<td>-0.017 (0.528)</td>
<td>0.006 (0.001)</td>
<td>0.195 (0.001)</td>
<td>-0.173 (0.001)</td>
<td>1.379 (0.001)</td>
<td>3.004 (0.001)</td>
<td>1.629 (0.001)</td>
<td>0.044 (0.009)</td>
<td>22.93% (0.001)</td>
<td>140.76</td>
</tr>
<tr>
<td>GM</td>
<td>20.077 (0.001)</td>
<td>0.021 (0.455)</td>
<td>0.007 (0.001)</td>
<td>0.226 (0.001)</td>
<td>-1.084 (0.001)</td>
<td>1.174 (0.001)</td>
<td>3.276 (0.001)</td>
<td>1.652 (0.001)</td>
<td>0.040 (0.022)</td>
<td>19.90% (0.001)</td>
<td>116.43</td>
</tr>
<tr>
<td>GLS</td>
<td>10.284 (0.001)</td>
<td>0.050 (0.011)</td>
<td>-0.001 (0.079)</td>
<td>0.075 (0.065)</td>
<td>-0.081 (0.081)</td>
<td>-0.688 (0.01)</td>
<td>0.240 (0.032)</td>
<td>0.140 (0.063)</td>
<td>0.010 (0.428)</td>
<td>3.49% (0.001)</td>
<td>16.93</td>
</tr>
<tr>
<td>CT</td>
<td>15.007 (0.001)</td>
<td>0.126 (0.004)</td>
<td>0.007 (0.001)</td>
<td>0.431 (0.001)</td>
<td>-1.000 (0.001)</td>
<td>0.344 (0.027)</td>
<td>1.202 (0.024)</td>
<td>-1.323 (0.001)</td>
<td>0.102 (0.001)</td>
<td>4.87% (0.001)</td>
<td>25.05</td>
</tr>
</tbody>
</table>
Panel B: Mean results of annual regressions

<table>
<thead>
<tr>
<th>CostEquity Measure $^b$</th>
<th>Intercept (?)</th>
<th>Auditor (+)</th>
<th>AuditQuality (+)</th>
<th>ln(Leverage) (+)</th>
<th>Size (+)</th>
<th>BETA (+)</th>
<th>VAR (+)</th>
<th>ln(B/M) (+)</th>
<th>Growth (+)</th>
<th>Adjusted $R^2$</th>
<th>F Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{PEG}$</td>
<td>19.539</td>
<td>-0.019</td>
<td>0.007</td>
<td>0.180</td>
<td>-0.175</td>
<td>1.301</td>
<td>3.148</td>
<td>1.599</td>
<td>0.016</td>
<td>23.22%</td>
<td>29.39</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.019)</td>
<td>(0.002)</td>
<td>(0.157)</td>
<td>(0.001)</td>
<td>(0.011)</td>
<td>(0.020)</td>
<td>(0.001)</td>
<td>(0.443)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{GM}$</td>
<td>20.039</td>
<td>-0.020</td>
<td>0.007</td>
<td>0.206</td>
<td>-1.080</td>
<td>1.095</td>
<td>3.390</td>
<td>1.612</td>
<td>0.014</td>
<td>20.08%</td>
<td>24.53</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.019)</td>
<td>(0.002)</td>
<td>(0.120)</td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.015)</td>
<td>(0.001)</td>
<td>(0.449)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{GLS}$</td>
<td>10.721</td>
<td>0.027</td>
<td>-0.001</td>
<td>0.082</td>
<td>-0.108</td>
<td>-0.737</td>
<td>0.154</td>
<td>0.225</td>
<td>-0.025</td>
<td>3.31%</td>
<td>4.21</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.019)</td>
<td>(0.002)</td>
<td>(0.012)</td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.045)</td>
<td>(0.042)</td>
<td>(0.428)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{CT}$</td>
<td>15.497</td>
<td>0.105</td>
<td>0.007</td>
<td>0.303</td>
<td>-1.001</td>
<td>0.551</td>
<td>1.403</td>
<td>-0.365</td>
<td>0.058</td>
<td>6.55%</td>
<td>8.018</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.019)</td>
<td>(0.002)</td>
<td>(0.025)</td>
<td>(0.002)</td>
<td>(0.034)</td>
<td>(0.212)</td>
<td>(0.110)</td>
<td>(0.362)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of observations 3,758

$^a$ p-values shown below parameter estimates.

$^b$ The four methods for cost of equity are used: PEG GM GLD CT.

Definitions for all variables are as follows:

- $\text{CostDebt}_j = \text{firm's ratio of interest expense to interest-bearing debt in year } t$;
- $\text{CostEquity}_j (\text{PEG}) = \text{firm's measure of cost of capital in year } t \text{ based on Easton (2004) measure}$;
- $\text{CostEquity}_j (\text{GM}) = \text{firm's measure of cost of capital in year } t \text{ based on Gode and Mohanram (2003) measure}$;
- $\text{CostEquity}_j (\text{GLS}) = \text{firm's measure of cost of capital in year } t \text{ based on Gebhardt et al. (2001) measure}$;
- $\text{CostEquity}_j (\text{CT}) = \text{firm's measure of cost of capital in year } t \text{ based on Claus and Thomas (2001) measure}$;
- $\text{Auditor}_j = \text{indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm}$;
- $\text{AuditQuality}_j = \text{standard deviation of firm } j \text{'s residuals } (\sigma)$, calculated over a five year period ($t-5$) through $t$ using the Dechow and Dichev (2002) model;
- $\ln(\text{Leverage})_j = \text{natural log of firm } j \text{'s ratio of interest bearing debt to total assets in year } t$;
- $\text{Size}_j = \text{natural log of firm } j \text{'s total assets in year } t$;
- $\text{ROA}_j = \text{firm } j \text{'s return on assets in year } t$;
- $\text{IntCov}_j = \text{firm } j \text{'s ratio of operating income to interest expense in year } t$;
- $\sigma(\text{NIBE})_j = \text{standard deviation of firm } j \text{'s net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period; five observations of NIBE at least are required to calculate the standard deviation}$;
- $\text{BETA}_j = \text{stock beta (systematic risk) calculated over 60 months ending in the month of the fiscal-year-end}$;
- $\text{VAR}_j = \text{earnings variability of firm } j \text{ measured by the dispersion in analysts’ earnings forecasts available on I/B/E/S database during the fiscal year-end } t$;
- $\ln(\text{B/M})_j = \text{natural log of firm } j \text{'s ratio of book value of equity to market value of equity as of fiscal year-end } t$; and
- $\text{Growth}_j = \text{forecasted growth of firm } j \text{ measured as the difference between the mean analysts’ two and one-year ahead earnings forecast scaled by the one-year ahead earnings forecast}$.
(AuditQuality) is positive and significant in the PEG, GM, and CT based measures of cost of equity (coefficient = 0.006, 0.007, 0.007; p-value = 0.001, 0.001, 0.001, respectively). Thus, the results reported suggest that (AuditQuality) is associated with the cost of equity. In other words, for higher level of audit quality, clients of Second-Tier audit firms experience higher values of cost of equity. This indicates that investors consider the quality of audit provided by the audit firm in their determination of the cost of equity.

The VIF values in the regression analyses of Model (8) indicate that the analyses are free from multicolinearity problem. However, Durbin-Watson test statistics in Model (8) indicates potential autocorrelation problem. Model (8) has VIF values that are less than 3.5 and Durbin-Watson statistics that are around 0.9. Following Francis et al. (2005), Model (8) is reestimated using the mean of annual regressions. Mean results of annual regressions are presented in Panel B of Table 14. The control variables used in Model (8) (Size, BETA, VAR, and ln(B/M)) are significantly associated with the cost of equity with the expected signs for only two of the cost of equity measures: PEG and GM. Beta is the only significant variable for the GLS measure of cost of equity, while Size is the only significant variable for the CT measure of cost of equity.

The variable of interest (Auditor) is not significant with any of the cost of equity measures: PEG, GM, GLS, or CT (coefficient = -0.019, -0.020, 0.027, 0.105; p-value = 0.619, 0.610, 0.527, 0.350 respectively). However, (AuditQuality) is positive and significant in the PEG, and GM based measures of cost of equity and marginally significant with the CT based measure of cost of equity (coefficient = 0.007, 0.007, 0.007; p-value = 0.002, 0.001, 0.070, respectively). Thus, the results reported suggest the previous finding that (AuditQuality) is associated with the cost of equity.
The results of the indicator variable (Auditor) fail to support hypothesis H3b. Results of regression Model (8) show that clients of Second-Tier audit firms do not experience significant higher cost of equity when compared to clients of Big-audit firms. These findings are not consistent with Khurana and Raman (2004). Two possible explanations could be the reason for these findings. First, investors may perceive Second-Tier audit firms to be an irrelevant risk factor in their determination of the cost of equity, especially in the post-2000 period, given the rigid SEC regulation.\textsuperscript{18} Information risk is the likelihood that firm-specific information that is pertinent to investor pricing decisions is of low quality. Since recent regulation requires audit firms to provide high quality audit levels, both Big-audit firms and Second-Tier audit firms are equally expected to provide high quality audit levels. Investors would evaluate information risk based on actual measures. The other explanation is that investors are becoming more objective in determining the cost of equity by paying more attention to the level of audit quality provided by the audit firm rather than focusing on whether the audit firm is a Big-audit firm or a Second-Tier audit firm.

4.5 Backdating of Executive Stock Options for Clients of Second-Tier Audit Firms

4.5.1 Sample

The sample of executive stock options grants is obtained from the Standards and Poor’s ExecuComp database. This database includes information about stock option grants from proxy statements for more than 2,000 large companies. This could lead to biased results because most large companies are audited by one of the Big-audit firms. The initial sample contained 15,043 grants to CEOs during the fiscal years from 2000 to 2005. After having

\textsuperscript{18} Khurana and Raman (2004) studies cost of equity association with Big-audit firm in the period from 1990 to 1999. The association between cost of equity and the size of the audit firm is significant in this time period.
excluded observations that (a) lacked grant date, (b) were not in CRSP, (c) lacked returns data in CRSP around the inferred grant date, or (d) did not meet the unscheduled criteria,\textsuperscript{19} the sample contained 6,751 grants. Firms audited by Second-Tier audit firms represent only 3.3 percent of the total final data set. The number of ESO grants used for clients of Second-Tier audit firms is 222 awards. For matching purposes, a random sample of 847 ESO grants is used to represent clients of Big-Audit firms.

4.5.2 Backdating Results

Figure 1 displays the average cumulative abnormal return from Day –30 to Day +30 around unscheduled awards for firms audited by Second-Tier audit firms. The abnormal returns around ESOs awards are calculated as the difference between the stock returns of the awarding firm and the returns predicted by Fama and French’s (1993) three factor model, where the estimation period is the year ending 50 days before the ESOs award date. The stock returns fluctuate during the month before the award grant date. However, there is a sharp increase in return trends on the grant date. Immediately after the grant date, the returns tend to increase. The increase in return is more pronounced during the first few days, but continues for the following 30 days. The evidence suggests that the granting of unscheduled ESOs for clients of Second-Tier audit firms are timed to occur before value increasing announcements.

\textsuperscript{19} An ESO award is classified as an unscheduled award if it does not occur within one week of the one-year anniversary of the prior year’s award date or if no options were awarded during the prior year.
FIGURE 1
Cumulative Abnormal Returns around ESOs Grants
for Clients of Second-Tier Audit Firms

This figure displays the cumulative abnormal stock returns from 30 days before through 30 days after ESO’s grants. Abnormal stock returns are estimated using the Fama and French (1993) three-factor model, where the estimated period is the year ending 50 days before the grant date. A random sample of 222 ESOs grants is used.
Figure 2 shows average cumulative abnormal returns for firms audited by Big-audit firms from Day –30 to Day +30 around unscheduled awards. The trend for clients of Big-audit firms is slightly different from the trend for clients of Second-Tier audit firms. Although, an increase in stock returns can be noticed in the period following the grant date of the ESOs, there is a remarkable decline in stock returns in the period preceding the grant date of ESOs when compared to clients of Second-Tier audit firms. The evidence suggests that the granting of unscheduled ESOs for clients of Big-Audit firms is timed to occur after bad news disclosures.

Figure 3 compares average cumulative abnormal returns for firms audited by Second-Tier audit firms and firms audited Big-audit firms from Day –30 to Day +30 around unscheduled awards. The illustration confirms the suggestion that ESOs for clients of Second-Tier audit firms are timed to occur before value increasing announcements (good news), while ESOs for clients of Big-Audit firms are timed to occur after bad news disclosures. Collins et al. (2005) explains the different results regarding timing of ESOs to occur around bad news versus good news announcements is that managers may find it easier to justify receiving options around good news announcements than around bad news announcements.

While Figure 3 gives a good sense for the economic significance for the return patterns and the difference in return patterns for clients of Second-Tier audit firms and clients of Big-audit firms, it does not provide the statistical significance. Table 15 present the mean cumulative abnormal returns for various periods around the grants along with the associated p-values for the null hypothesis that the averages equal zero. The periods in the table include the month from 30 to 11 trading days before the grant, the week from 10 to 6 days before, each of the days from 5 days before to 5 days after the grant, the week from 6 to 10 days after the grant, and the month from 11 to 30 days after the grant.
FIGURE 2
Cumulative Abnormal Returns around ESOs Grants
for Clients of Big-Audit Firms

This figure displays the cumulative abnormal stock returns from 30 days before through 30 days after ESO’s grants. Abnormal stock returns are estimated using the Fama and French (1993) three-factor model, where the estimated period is the year ending 50 days before the grant date. A random sample of 847 ESOs grants is used.
FIGURE 3
Cumulative Abnormal Returns around ESOs Grants
for Clients of Second-Tier Audit Firms and Big-Audit Firms

This figure displays the cumulative abnormal stock returns from 30 days before through 30 days after ESO’s grants. Abnormal stock returns are estimated using the Fama and French (1993) three-factor model, where the estimated period is the year ending 50 days before the grant date.
This table presents a paired t-test of the firm specific cumulative abnormal stock returns from 30 days before through 30 days after ESO’s grants. Abnormal stock returns are estimated using the Fama and French (1993) three-factor model, where the estimated period is the year ending 50 days before the grant date. Numbers that are significantly different from zero at the one percent level are boldfaced.
Results show that the vast majority of the average daily cumulative abnormal returns for the sample of clients of Second-Tier audit firms do not differ significantly from zero at the one percent level. However, the case is different for the sample of clients of Big-audit firms, where the majority of the average daily cumulative abnormal returns differ significantly from zero at the one percent level, especially in the period between day -3 and day 2 around the ESO grant date. Therefore, it appears that clients of Big-audit firms backdate ESOs grants more frequently compared to clients of Second-Tier audit firms.

Table 16 presents differences in cumulative abnormal returns around ESOs grants between clients of Second-Tier audit firms and Big-audit firms. Following Lie (2004), cumulative abnormal returns are calculated for the 5-, 10-, 20-, 30-day periods around the ESOs’ grant dates. Results show that cumulative abnormal returns for clients of Big-audit firms are significantly larger than cumulative abnormal returns for clients of Second-Tier audit firms for all of the cumulating periods around the grant dates. The cumulative abnormal returns for the period intervals of 1-, 2-, 3-, 4-, and 5-days prior and subsequent to ESO grants is also calculated to check the differences between cumulative abnormal returns for clients of Second-Tier audit firms and Big-audit firms in the period around the grant date. Results also show that cumulative abnormal returns for clients of Big-audit firms are still significantly larger than cumulative abnormal returns for clients of Second-Tier audit firms. Therefore, based on the results in Table 15 and Table 16, it appears that clients of Big-audit firms backdate ESOs grants more frequently compared to clients of Second-Tier audit firms.
TABLE 16
Differences in Cumulative Abnormal Returns around Executive Stock Option Grants
Between Second-Tier Audit Firms and Big-Audit Firms

<table>
<thead>
<tr>
<th>Second-Tier Audit</th>
<th>Firms</th>
<th>Big-Audit Firms</th>
<th>Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR (-30,0)</td>
<td>-0.00082</td>
<td>-0.01954</td>
<td>0.01872</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-20,0)</td>
<td>-0.00027</td>
<td>-0.02525</td>
<td>0.02499</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-10,0)</td>
<td>-0.00069</td>
<td>-0.02969</td>
<td>0.02900</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-5,0)</td>
<td>-0.00058</td>
<td>-0.03432</td>
<td>0.03374</td>
<td>0.0004</td>
</tr>
<tr>
<td>CAR (1,5)</td>
<td>0.014962</td>
<td>-0.03603</td>
<td>0.05099</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (1,10)</td>
<td>0.021233</td>
<td>-0.03277</td>
<td>0.05401</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (1,20)</td>
<td>0.029841</td>
<td>-0.02183</td>
<td>0.05167</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (1,30)</td>
<td>0.039174</td>
<td>-0.01564</td>
<td>0.05482</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-1,1)</td>
<td>0.00492</td>
<td>-0.03803</td>
<td>0.04295</td>
<td>0.0009</td>
</tr>
<tr>
<td>CAR (-2,2)</td>
<td>0.00552</td>
<td>-0.03807</td>
<td>0.04360</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-3,3)</td>
<td>0.00595</td>
<td>-0.03719</td>
<td>0.04314</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-4,4)</td>
<td>0.00611</td>
<td>-0.03584</td>
<td>0.04195</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-5,5)</td>
<td>0.00649</td>
<td>-0.03509</td>
<td>0.04158</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

This table presents a paired t-test of the firm specific cumulative abnormal stock returns between Second-Tier audit firms and Big-audit firms. CAR (-30, 0), CAR (-20, 0), CAR (-10, 0), CAR (-5, 0) are cumulative abnormal returns for the 30 days, 20 days, 10 days, and 5 days periods prior to ESO grants; CAR (1, 5), CAR (1, 10), CAR (1, 20), CAR (1, 30), are cumulative abnormal returns for the 5 days, 10 days, 20 days, and 20 days periods subsequent to ESO grants; and CAR (-1, 1), CAR (-2, 2), CAR (-3, 3), CAR (-4, 4), CAR (-5, 5)are cumulative abnormal returns for the period intervals of 1 day, 2 days, 3 days, 4 days, and 5 days prior and subsequent to ESO grants.
Figure 4 presents average cumulative abnormal returns for firms audited by Second-Tier audit firms in the Pre- and Post-SOX periods. The numbers of ESO grants used for the Pre-SOX period are 85 awards, and for the Post-SOX period are 137 awards. The returns pattern suggests that clients of Second-Tier audit firms in the Post-SOX period do not exercise backdating of executive stock options as it was the case in the Pre-SOX period. This finding supports the notion that accelerated reporting requirements deters, if not eliminated, the opportunistic granting of unscheduled awards in the Post-SOX period.

Table 17 presents differences in cumulative abnormal returns around ESOs grants between clients of Second-Tier audit firms in the pre- and post-SOX periods. Similar to Table 16, cumulative abnormal returns are calculated for the 5-, 10-, 20-, 30-day periods around the ESOs’ grant dates. Results show that cumulative abnormal returns for clients of Second-Tier audit firms in the post-SOX period are significantly lower than cumulative abnormal returns for clients of Second-Tier audit firms in the pre-SOX period for all of the cumulating periods around the grant dates. The cumulative abnormal returns for the period intervals of 1-, 2-, 3-, 4-, and 5-days prior and subsequent to ESO grants is also calculated to check the differences in cumulative abnormal returns around the grant date for clients of Second-Tier audit firms between the pre- and post-SOX periods. Results also show that cumulative abnormal returns for clients of Second-Tier audit firms in the post-SOX period are still significantly lower than cumulative abnormal returns for clients of Second-Tier audit firms in the pre-SOX period around the grant dates. These results support the findings of Figure 4 that suggests that clients of Second-Tier audit firms in the Post-SOX period do not exercise backdating of executive stock options as it was the case in the Pre-SOX period.
FIGURE 4
Cumulative Abnormal Returns around ESOs Grants
for Clients of Second-Tier Audit Firms in the Pre- and Post-SOX Periods

This figure displays the cumulative abnormal stock returns from 30 days before through 30 days after ESO’s grants. Abnormal stock returns are estimated using the Fama and French (1993) three-factor model, where the estimated period is the year ending 50 days before the grant date.
<table>
<thead>
<tr>
<th></th>
<th>Pre-SOX</th>
<th>Post-SOX</th>
<th>Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR (-30,0)</td>
<td>0.02378</td>
<td>-0.01607</td>
<td>-0.03985</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-20,0)</td>
<td>0.03017</td>
<td>-0.01915</td>
<td>-0.04932</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-10,0)</td>
<td>0.03702</td>
<td>-0.02408</td>
<td>-0.0611</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-5,0)</td>
<td>0.04374</td>
<td>-0.02807</td>
<td>-0.0618</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (1,5)</td>
<td>0.08673</td>
<td>-0.02956</td>
<td>-0.11629</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (1,10)</td>
<td>0.10067</td>
<td>-0.02805</td>
<td>-0.12872</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (1,20)</td>
<td>0.12565</td>
<td>-0.02961</td>
<td>-0.15526</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (1,30)</td>
<td>0.15321</td>
<td>-0.03157</td>
<td>-0.18478</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-1,1)</td>
<td>0.06321</td>
<td>-0.03125</td>
<td>-0.09446</td>
<td>0.0058</td>
</tr>
<tr>
<td>CAR (-2,2)</td>
<td>0.06370</td>
<td>-0.03057</td>
<td>-0.09427</td>
<td>0.0002</td>
</tr>
<tr>
<td>CAR (-3,3)</td>
<td>0.06381</td>
<td>-0.02995</td>
<td>-0.09377</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-4,4)</td>
<td>0.06350</td>
<td>-0.02949</td>
<td>-0.09299</td>
<td>0.0001</td>
</tr>
<tr>
<td>CAR (-5,5)</td>
<td>0.06328</td>
<td>-0.02875</td>
<td>-0.09204</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

This table presents a paired t-test of the firm specific cumulative abnormal stock returns between pre- and post-SOX periods for clients of Second-Tier audit firms. CAR (-30, 0), CAR (-20, 0), CAR (-10, 0), CAR (-5, 0) are cumulative abnormal returns for the 30 days, 20 days, 10 days, and 5 days periods prior to ESO grants; CAR (1, 5), CAR (1, 10), CAR (1, 20), CAR (1, 30), are cumulative abnormal returns for the 5 days, 10 days, 20 days, and 20 days periods subsequent to ESO grants; and CAR (-1, 1), CAR (-2, 2), CAR (-3, 3), CAR (-4, 4), CAR (-5, 5) are cumulative abnormal returns for the period intervals of 1 day, 2 days, 3 days, 4 days, and 5 days prior and subsequent to ESO grants.
Overall, the return trends around ESOs grant dates for clients of Big-audit firms are more pronounced than for clients of Second-Tier audit firms during the sample period. However, these return trends cannot be observed in the Post-SOX period. This finding is not consistent with hypothesis H4 that predicts Second-Tier audit firms’ clients exercise backdating of executive stock options more frequently than Big-audit firms’ clients, but it provides important evidence on the impact of new regulations on mitigating executive opportunistic behavior associated with ESO grants for clients of Second-Tier audit firms.

4.6 Supplemental Tests

Findings of this study, based on the Dechow and Dichev’s (2002) model, show that the audit quality provided by Big-audit firms to their clients is higher than the audit quality provided by Second-Tier audit firms and that the audit quality provided to clients of Second-Tier audit firms did not change in the post-SOX period. In order to assess the robustness of the findings pertaining to audit quality, an alternative measure of audit quality is estimated. In this section, discretionary accrual based on the Jones (1991) model is estimated. However, it is important to highlight the problems related to using discretionary accruals as a measure of audit quality.

Most prior auditor quality research has focused on financial reporting quality (e.g., Krishnan et al. 2007; Carey and Simnett 2006; Francis and Yu 2007). However, this may not be the right construct because management, not the auditor, is directly responsible for financial reporting quality. Additionally, there is no consensus on the best approach to use to measure discretionary accruals, and although attempts are made to control for factors that have an impact on a company’s financial reporting quality, there is no certainty that all of these factors
are known and susceptible of measurement. However, audit quality is a variable that is difficult to observe and is difficult to measure objectively, which creates the need to apply different methods of estimating it.

Following Choi et al. (2007) and Francis and Yu (2007), the modified Jones (1991) model is applied to estimate discretionary accruals. The following model using ordinary least squares regressions is estimated:

$$\frac{TA_{jt}}{Assets_{jt-1}} = \phi_{0,j} + \phi_{1,j} \frac{1}{Assets_{jt-1}} + \phi_{2,j} \frac{\Delta Re_{jt} - \Delta Re_{c,t}}{Assets_{jt-1}} + \phi_{3,j} PPE_{jt} + \phi_{4,j} ROA_{jt} + \nu_{jt} \quad (10)$$

where,

- $TA_{jt}$ = total accruals in year $t$;
- $\Delta CA_{jt}$ = firm $j$’s change in current assets between year $t-1$ and year $t$;
- $\Delta CL_{jt}$ = firm $j$’s change in current liabilities between year $t-1$ and year $t$;
- $\Delta Cash_{jt}$ = firm $j$’s change in cash between year $t-1$ and year $t$;
- $\Delta STDEBT_{jt}$ = firm $j$’s change in debt in current liabilities between year $t-1$ and year $t$;
- $DEPN_{jt}$ = firm $j$’s depreciation and amortization expense in year $t$;
- $Assets_{jt-1}$ = firm $j$’s total assets in year $t-1$;
- $\Delta Re_{jt}$ = firm $j$’s change in revenues between year $t-1$ and year $t$;
- $PPE_{jt}$ = firm $j$’s gross value of property, plant, and equipment in year $t$; and
- $ROA_{jt}$ = firm $j$’s net income divided by total assets in year $t$.
Following Kothari et al. (2005), ROA is included in the accrual model as a control for performance measure. This is a simplified approach of the performance matching approach suggested in Kothari et al. (2005).

Discretionary accrual ($DACC$) is the unexplained portion of Model (10) reflected in the residual ($\nu$). The absolute value of discretionary accruals $|DACC|$ is the proxy for audit quality, where higher values indicate lower audit quality and lower values indicate higher audit quality. The residual allows examining the association between the absolute value of discretionary accruals, as a proxy for audit quality, and audit firm size. In addition, it also enables examining the association between SOX and audit quality for Second-Tier audit firms. Cost of debt and cost of equity are also examined for their association with discretionary accruals.

Table 18 presents the results of Model (4) after replacing the Dechow and Dichev’s (2002) measure of audit quality with the discretionary accruals measure. All control variables used are the same as the original model for comparative purposes. The results of Model (4) are presented with two specifications. The first column of Table 18 shows the result of Model (4) without including the auditor indicator variable ($Auditor$). The model is significant but yields a very low adjusted $R^2$ (0.48 percent). Two of the independent variables in Model (4) are significant and the signs of their coefficients are as predicted ($Size$ and $NegEarn$). Previous research (e.g., Francis and Yu 2007) supports the negative association between ($Size$) and ($|DACC|$) in recent periods, because larger clients are expected to have better control of abnormal accruals. This negative association between ($Size$) and ($|DACC|$) contrasts with previous finding using the standard deviation of abnormal accruals based on the Dichow and

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20 Summary statistics for variables used in the supplemental analysis are presented in Table 6 and Table 11. The mean and the median values for absolute values of discretionary accruals are presented in Panel C of Table 6.
### TABLE 18

**Discretionary Accruals and Audit Firm Regression Results**

(Dependent variable: Absolute value of discretionary accruals)

\[
\left| \text{DACC}_t \right| = \phi_0 + \phi_1 \text{Auditor}_t + \phi_2 \text{Size}_t + \phi_3 \sigma(\text{CFO})_t + \phi_4 \sigma(\text{Sales})_t + \phi_5 \text{OperCycle}_t + \phi_6 \text{NegEarn}_t + \mu_t
\]

(4)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Predicted Sign</th>
<th>Coefficient</th>
<th>T-statistic (p-value)</th>
<th>Coefficient</th>
<th>T-statistic (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>?</td>
<td>3.099</td>
<td>3.81 (0.001)</td>
<td>0.862</td>
<td>2.95 (0.003)</td>
</tr>
<tr>
<td>Auditor</td>
<td>+</td>
<td></td>
<td>0.374 1.95 (0.052)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>–</td>
<td>-0.628</td>
<td>-9.40 (0.001)</td>
<td>-0.079</td>
<td>-6.89 (0.001)</td>
</tr>
<tr>
<td>(\sigma(\text{CFO}))</td>
<td>+</td>
<td>0.001</td>
<td>1.82 (0.068)</td>
<td>0.001</td>
<td>1.65 (0.098)</td>
</tr>
<tr>
<td>(\sigma(\text{Sales}))</td>
<td>+</td>
<td>0.001</td>
<td>1.52 (0.129)</td>
<td>0.001</td>
<td>1.33 (0.182)</td>
</tr>
<tr>
<td>OperCycle</td>
<td>+</td>
<td>0.228</td>
<td>1.59 (0.112)</td>
<td>0.144</td>
<td>1.55 (0.120)</td>
</tr>
<tr>
<td>NegEarn</td>
<td>+</td>
<td>-0.109</td>
<td>-2.08 (0.037)</td>
<td>-0.052</td>
<td>-1.98 (0.048)</td>
</tr>
</tbody>
</table>

Number of observations
- 21,263

Model F-statistic
- 21.03 (0.001)

Model Adjusted R^2
- 0.47%

\(\sigma(\text{CFO})_t\) = standard deviation of firm \(j\)'s CFO, calculated over the past 10 years;
\(\sigma(\text{Sales})_t\) = standard deviation of firm \(j\)'s sales revenue, calculated over the past 10 years;
OperCycle\(_t\) = natural log of firm \(j\)'s operating cycle, measured as the sum of days accounts receivable and days inventory; and
NegEarn\(_t\) = number of years, out of the past 10 years, where firm \(j\) reported net income before extraordinary items less than zero.

---

\(^{a}\) Definitions for all variables are as follows:

\(\left| \text{DACC}_t \right|\) = absolute value of discretionar\(y\) accruals of firm \(j\) in year \(t\) using the modified Jones (1991) model;

\(\text{Auditor}_t\) = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm;

\(\text{Size}_t\) = firm size measured as the natural log of total assets in year \(t\);

\(\sigma(\text{CFO})_t\) = standard deviation of firm \(j\)'s CFO, calculated over the past 10 years;

\(\sigma(\text{Sales})_t\) = standard deviation of firm \(j\)'s sales revenue, calculated over the past 10 years;

OperCycle\(_t\) = natural log of firm \(j\)'s operating cycle, measured as the sum of days accounts receivable and days inventory; and

NegEarn\(_t\) = number of years, out of the past 10 years, where firm \(j\) reported net income before extraordinary items less than zero.
Dichev (2002) model. This difference is due to the difference in the nature of the two measures. Big clients are expected to have lower value of abnormal accruals when compared to small client firms. However, the variability in abnormal accruals is expected to be larger in big clients when compared to small clients.

The second column of Table 18 shows the result of Model (4) with the auditor indicator variable (Auditor) included in the model. The results of Model (4) support previous finding, where the auditor indicator variable (Auditor) is marginally significant and positive (coefficient = 0.374, p-value = 0.052). This supports previous findings that audit quality provided by Big-audit firms to their clients is higher than the audit quality provided by Second-Tier audit firms.

Table 19 presents the results of Model (5) after replacing the Dechow and Dichev’s (2002) measure of audit quality with the discretionary accruals measure. Firms audited by Second-tier audit firms are only used in the analysis. The model is presented with two specifications. The first column of Table 19 shows the result of Model (5) without including the indicator variable (Period). The only significant control variable is the variable (Size) (coefficient = -1.185, p-value = 0.001). The second column of Table 19 shows the result of Model 5 with the indicator variable (Period) included in the model. The indicator variable (Period) equals 1 if the audit period is equal or post-2002 and 0 if the audit period is pre-2002. The indicator variable (Period) is positive but not significant (coefficient = 1.117, p-value = 0.242). These results are consistent with previous findings that audit quality provided to clients of Second-Tier audit firms did not change in the post-SOX period.
TABLE 19
Discretionary Accruals and SOX Period Regression Results for Second-Tier Audit Firms

(Dependent variable: Absolute value of discretionary accruals)

\[
[DACC]_{jt} = \phi_0 + \phi_1 Period_{jt} + \phi_2 Size_{jt} + \phi_3 \sigma(CFO)_{jt} + \phi_4 \sigma(Sales)_{jt} + \phi_5 \text{OperCycle}_{jt}
+ \phi_6 \text{NegEarn}_{jt} + \mu_{jt}
\] (5)

<table>
<thead>
<tr>
<th>Independent Variables ( ^a )</th>
<th>Predicted Sign</th>
<th>Coefficient</th>
<th>T-statistic ((p\text{-value}))</th>
<th>Coefficient</th>
<th>T-statistic ((p\text{-value}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>?</td>
<td>5.110</td>
<td>2.30 ((0.022))</td>
<td>4.761</td>
<td>2.12 ((0.034))</td>
</tr>
<tr>
<td>Period</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>–</td>
<td>-1.185</td>
<td>-4.99 ((0.001))</td>
<td>-1.181</td>
<td>-4.97 ((0.001))</td>
</tr>
<tr>
<td>(\sigma(CFO))</td>
<td>+</td>
<td>0.008</td>
<td>0.54 ((0.591))</td>
<td>0.008</td>
<td>0.54 ((0.588))</td>
</tr>
<tr>
<td>(\sigma(Sales))</td>
<td>+</td>
<td>0.001</td>
<td>0.15 ((0.881))</td>
<td>0.001</td>
<td>0.13 ((0.899))</td>
</tr>
<tr>
<td>OperCycle</td>
<td>+</td>
<td>0.126</td>
<td>0.31 ((0.754))</td>
<td>0.146</td>
<td>0.36 ((0.717))</td>
</tr>
<tr>
<td>NegEarn</td>
<td>+</td>
<td>-0.117</td>
<td>-0.74 ((0.457))</td>
<td>-0.128</td>
<td>-0.81 ((0.418))</td>
</tr>
</tbody>
</table>

Number of observations 5,879 5,879

Model 5.37 4.71
\(F\text{-statistic} \ (0.001) \ (0.001)\)

Model

Adjusted \(R^2\) 0.37% 0.38%

\( ^a \) Definitions for all variables are as follows:

- \([DACC]_{jt} = \) absolute value of discretionary accruals of firm \( j \) in year \( t \) using the modified Jones (1991) model;
- \( Period_{jt} = \) indicator variable that equals 1 if the audit period is equal or post-2002 and 0 if the audit period is pre-2002;
- \( Size_{jt} = \) firm size measured as the natural log of total assets in year \( t \);
- \( \sigma(CFO)_{jt} = \) standard deviation of firm \( j \)'s CFO, calculated over the past 10 years;
- \( \sigma(Sales)_{jt} = \) standard deviation of firm \( j \)'s sales revenue, calculated over the past 10 years;
- \( \text{OperCycle}_{jt} = \) natural log of firm \( j \)'s operating cycle, measured as the sum of days accounts receivable and days inventory; and
- \( \text{NegEarn}_{jt} = \) number of years, out of the past 10 years, where firm \( j \) reported net income before extraordinary items less than zero.
Table 20 presents the results of Model 6 after replacing the Dechow and Dichev’s (2002) measure of audit quality for the dependent variable with the discretionary accruals measure. The first column of Table 20 shows the result of Model 6 using a sample of clients of both Big-audit firms and Second-Tier audit firms. The findings in these supplemental tests are not consistent with previous results. The independent variable of interest (\( \ln \text{FEE} \)) is positive but not significant (coefficient = 0.245, p-value = 1.20). The second column of Table 20 shows the result of Model 6 using a sample of clients of Second-Tier audit firms only. The results are similar to the previous results using clients of all audit firms. The indicator variable (\( \ln \text{FEE} \)) is positive and significant (coefficient = 1.095, p-value = 0.242).

Although, discretionary accruals have been one of the most applied measures of audit quality,\(^{21}\) it is possible that this measure of audit quality may lead to biased results.

Table 21 reports the results of estimating Model (7) using absolute discretionary accruals as a measure for audit quality in replacement of the Dechow and Dichev’s (2002) measure of audit quality. ROA is dropped from the model due to collinearity problem with the discretionary accrual variable. Overall, the model is significant yielding an adjusted R\(^2\) of 14.12 percent. The variable Auditor is significantly positively correlated to CostDebt (coefficient = 0.240, p-value = 0.001), suggesting that clients of Second-Tier audit firms incur higher cost of debt when compared to clients of Big-audit firms. However, inconsistent with previous findings, \(|DACC|\) is insignificant (coefficient = -0.023, p-value = 0.101), which does not support previous finding that cost of debt is associated with audit quality. All other control variables are significant and in the predicted direction except for the interest coverage variable (IntCov).

\(^{21}\)Recent research studies rely on accounting accruals as a proxy for audit quality (e.g., Carey and Simnett 2006; Francis and Yu 2007; Choi et al. 2007). Other measures of audit quality like audit tenure and audit opinion are less frequently used as an only proxy for audit quality.


**TABLE 20**  
Discretionary Accruals and Audit Fees Regression Results  
(Dependent variable: Absolute value of discretionary accruals)

\[
[DACC]_{jt} = \phi_0 + \phi_1 \ln FEE_{jt} + \phi_2 \text{Size}_{jt} + \phi_3 \sigma(CFO)_{jt} + \phi_4 \sigma(Sales)_{jt} + \phi_5 \text{OperCycle}_{jt} + \phi_6 \text{NegEarn}_{jt} + \mu_{jt} 
\]

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Predicted Sign</th>
<th>Coefficient</th>
<th>T-statistic (p-value)</th>
<th>T-statistic (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>?</td>
<td>-1.110</td>
<td>-0.49 (0.624)</td>
<td>-10.885 (0.285)</td>
</tr>
<tr>
<td>lnFEE</td>
<td>?</td>
<td>0.245</td>
<td>1.20 (0.230)</td>
<td>1.095 (0.242)</td>
</tr>
<tr>
<td>Size</td>
<td>-</td>
<td>-0.600</td>
<td>-4.42 (0.001)</td>
<td>-1.775 (0.002)</td>
</tr>
<tr>
<td>σ(CFO)</td>
<td>+</td>
<td>0.001</td>
<td>1.09 (0.276)</td>
<td>0.011 (0.631)</td>
</tr>
<tr>
<td>σ(Sales)</td>
<td>+</td>
<td>0.001</td>
<td>1.07 (0.286)</td>
<td>0.001 (0.826)</td>
</tr>
<tr>
<td>OperCycle</td>
<td>+</td>
<td>0.395</td>
<td>2.14 (0.033)</td>
<td>1.292 (0.048)</td>
</tr>
<tr>
<td>NegEarn</td>
<td>+</td>
<td>-0.077</td>
<td>-1.25 (0.211)</td>
<td>-0.196 (0.398)</td>
</tr>
</tbody>
</table>

Number of observations  
All Firms: 13,939  
Second-Tier Audit Firms: 3,504  

Model F-statistic  
All Firms: 6.30 (0.001)  
Second-Tier Audit Firms: 2.70 (0.013)  

Adjusted R²  
All Firms: 0.23%  
Second-Tier Audit Firms: 0.29%  

---

\(a\) Definitions for all variables are as follows:  
\( [DACC]_{jt} \) = absolute value of discretionary accruals of firm \( j \) in year \( t \) using the modified Jones (1991) model;  
\( \ln FEE_{jt} \) = natural logarithm of the audit fees paid by audit client \( i \) in year \( t \) ($ actual);  
\( \text{Size}_{jt} \) = firm size measured as the natural log of total assets in year \( t \);  
\( \sigma(CFO)_{jt} \) = standard deviation of firm \( j \)'s CFO, calculated over the past 10 years;  
\( \sigma(Sales)_{jt} \) = standard deviation of firm \( j \)'s sales revenue, calculated over the past 10 years;  
\( \text{OperCycle}_{jt} \) = natural log of firm \( j \)'s operating cycle, measured as the sum of days accounts receivable and days inventory; and  
\( \text{NegEarn}_{jt} \) = number of years, out of the past 10 years, where firm \( j \) reported net income before extraordinary items less than zero.
# TABLE 21

Cost of Debt Sensitivity Analysis Regression Results

(Independent variable: Cost of debt)

\[ \text{CostDebt}_j = \phi_0 + \phi_1 \text{Auditor}_j + \phi_2 |\text{DACC}|_j + \phi_3 \ln(\text{Leverage})_j + \phi_4 \text{Size}_j \\
+ \phi_5 \text{IntCov}_j + \phi_6 \sigma(\text{NIBE})_j + \mu_j \]  

(7)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Predicted Sign</th>
<th>Coefficient</th>
<th>T-statistic (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>3.003</td>
<td>3.05 (0.002)</td>
</tr>
<tr>
<td>Auditor</td>
<td>+</td>
<td>0.240</td>
<td>3.52 (0.001)</td>
</tr>
<tr>
<td>(</td>
<td>\text{DACC}</td>
<td>)</td>
<td>+</td>
</tr>
<tr>
<td>( \ln(\text{Leverage}) )</td>
<td>+</td>
<td>-3.818</td>
<td>-26.36 (0.001)</td>
</tr>
<tr>
<td>Size</td>
<td></td>
<td>-0.367</td>
<td>-3.48 (0.001)</td>
</tr>
<tr>
<td>IntCov</td>
<td></td>
<td>0.488</td>
<td>2.15 (0.031)</td>
</tr>
<tr>
<td>( \sigma(\text{NIBE}) )</td>
<td>+</td>
<td>1.133</td>
<td>3.57 (0.001)</td>
</tr>
</tbody>
</table>

Standard Deviation of Residuals \( \sigma(\mu) \)

<table>
<thead>
<tr>
<th>Number of observations</th>
<th>5,201</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>143.44</td>
</tr>
<tr>
<td>F-statistic</td>
<td>(0.001)</td>
</tr>
</tbody>
</table>

Definitions for all variables are as follows:

- \( \text{CostDebt}_j \) = firm \( j \)’s ratio of interest expense to interest-bearing debt in year \( t \);
- \( \text{Auditor}_j \) = indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm;
- \( |\text{DACC}|_j \) = absolute value of discretionary accruals of firm \( j \) in year \( t \); calculated over a five years period \( (t-4) \) through \( t \) using the modified Jones (1991) model;
- \( \ln(\text{Leverage})_j \) = natural log of firm \( j \)’s ratio of interest bearing debt to total assets in year \( t \);
- \( \text{Size}_j \) = natural log of firm \( j \)’s total assets in year \( t \);
- \( \text{IntCov}_j \) = firm \( j \)’s ratio of operating income to interest expense in year \( t \);
- \( \sigma(\text{NIBE})_j \) = standard deviation of firm \( j \)’s net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period; five observations of NIBE at least are required to calculate the standard deviation.
Table 22 presents the regression results of estimating Model (8). These regressions examine whether Second-Tier audit firms are associated with a higher cost of equity for their clients, and whether the audit quality provided by audit firms is associated with the cost of equity of their clients. The measure of audit quality based on the Dechow and Dichev’s (2002) model is replaced with absolute value of discretionary accruals as a proxy for audit quality. As indicated previously in Table 14, Model 8 applies four methods of measuring cost of equity. These four measures are PEG, GM, GLS, and CT. The PEG and the GM cost of equity based regressions have the highest $R^2$ values (19.23 percent and 16.30 percent, respectively). The variable of interest (Auditor) is not significant with three of the cost of equity measures (PEG, GM, GLS) (coefficient = 0.006, 0.007, 0.034; p-value = 0.818, 0.808, 0.087 respectively). However it is positively significant with the CT measure of cost of equity (coefficient = 0.141; p-value = 0.001). On the other hand, the absolute discretionary accruals measure for audit quality is not significant in all of the four measures of cost of equity. For the first part of these findings, the results are consistent with previous results that show that clients of Second-Tier audit firms do not experience significant higher cost of equity when compared to clients of Big-audit firms. The second part of these findings does not support previous results in the association between cost of equity and audit quality.

Fuerman (2007) criticizes the approach of using financial reporting quality as an indicator of audit quality because management, not the auditor, is directly responsible for financial reporting quality. However, previous research could not provide a more objective tool to proxy for audit quality. In this study, regression results show that the use of the Dechow and Dichev’s (2002) model to proxy for audit quality provides better indicator of audit quality when compared to discretionary accruals. This is reflected in the better fit of the models where the Dechow and Dichev’s (2002) model is applied.
### TABLE 22
Cost of Equity Sensitivity Analysis Regressions Results

(Dependent variables: Cost of equity measures) \(^a\)

\[
\text{CostEquity}_{it} = \phi_0 + \phi_Auditor_{it} + \phi_2|DACC|_{it} + \phi_3 \ln(\text{Leverage})_{it}
+ \phi_4 \text{Size}_{it} + \phi_5 BETA_{it} + \phi_6 \text{VAR}_{it} + \phi_7 \ln(B/M)_{it} + \phi_8 \text{Growth}_{it} + \mu_{it}
\]  \(^{(8)}\)

| CostEquity Measure | Intercept \(^{(2)}\) | Auditor (+) | \(|DACC|\) (+) | ln(Leverage) (+) | Size (-) | BETA (+) | VAR (+) | ln(B/M) (+) | Growth (+) | Adjusted \(R^2\) | F Value |
|--------------------|------------------|-------------|--------------|----------------|----------|----------|---------|-------------|------------|----------------|---------|
| PEG                | 17.675 \(0.001\) | 0.006 \(0.818\) | 0.124 \(0.784\) | 0.199 \(0.001\) | - \(0.822\) \(0.001\) | 1.074 \(0.001\) | 2.784 \(0.001\) | 1.572 \(0.001\) | 0.041 \(0.020\) | 19.23\% | 117.32 \(0.001\) |
| GM                 | 17.976 \(0.001\) | 0.007 \(0.808\) | 0.162 \(0.726\) | 0.215 \(0.001\) | - \(0.931\) \(0.001\) | 0.931 \(0.001\) | 3.008 \(0.001\) | 1.570 \(0.001\) | 0.038 \(0.037\) | 16.30\% | 96.18 \(0.001\) |
| GLS                | 10.748 \(0.001\) | 0.034 \(0.887\) | 0.374 \(0.261\) | 0.060 \(0.119\) | - \(0.271\) \(0.270\) | 0.271 \(0.270\) | 0.152 \(0.039\) | 0.015 \(0.236\) | 3.83\% | 20.47 \(0.001\) |
| CT                 | 13.661 \(0.001\) | 0.141 \(0.853\) | 0.136 \(0.001\) | 0.476 \(0.001\) | - \(0.197\) \(0.159\) | 0.197 \(0.159\) | 1.085 \(0.045\) | -1.529 \(0.001\) | 0.091 \(0.001\) | 4.48\% | 23.90 \(0.001\) |

Number of observations \(3,910\)

\(^a\) \(p\)-values shown below parameter estimates.

\(^b\) Four methods for cost of equity are used: PEG GM GLD CT.
Definitions for all variables are as follows: 

\( \text{CostDebt}_j = \) firm \( j \)'s ratio of interest expense to interest-bearing debt in year \( t \); \( \text{CostEquity}_{j}^{(PEG)} = \) firm \( j \)'s measure of cost of capital in year \( t \) based on Easton (2004) measure; \( \text{CostEquity}_{j}^{(GM)} = \) firm \( j \)'s measure of cost of capital in year \( t \) based on Gode and Mohanram (2003); \( \text{CostEquity}_{j}^{(GLS)} = \) firm \( j \)'s measure of cost of capital in year \( t \) based on Gebhardt et al. (2001) measure; \( \text{CostEquity}_{j}^{(CT)} = \) firm \( j \)'s measure of cost of capital in year \( t \) based on Claus and Thomas (2001) measure; \( \text{Auditor}_{j} = \) indicator variable that equals 1 if the client’s audit firm is a Second-Tier audit firm and 0 if the client’s audit firm is a Big-audit firm; \( |\text{DACC}|_j = \) absolute value of discretionary accruals of firm \( j \) in year \( t \) using the modified Jones (1991) model; \( \ln(\text{Leverage})_j = \) natural log of firm \( j \)'s ratio of interest bearing debt to total assets in year \( t \); \( \text{Size}_j = \) natural log of firm \( j \)'s total assets in year \( t \); \( \text{ROA}_j = \) firm \( j \)'s return on assets in year \( t \); \( \text{IntCov}_j = \) firm \( j \)'s ratio of operating income to interest expense in year \( t \); \( \sigma(\text{NIBE})_j = \) standard deviation of firm \( j \)'s net income before extraordinary items (NIBE), scaled by average assets, over the rolling prior 10-year period; five observations of NIBE at least are required to calculate the standard deviation; \( \text{BETA}_j = \) stock beta (systematic risk) calculated over 60 months ending in the month of the fiscal-year-end; \( \ln(\text{B/M})_j = \) earnings variability of firm \( j \) measured by the dispersion in analysts’ earnings forecasts available on I/B/E/S database during the fiscal year-end \( t \); \( \ln(\text{B/M})_j = \) natural log of firm \( j \)'s ratio of book value of equity to market value of equity as of fiscal year-end \( t \); and \( \text{Growth}_j = \) forecasted growth of firm \( j \) measured as the difference between the mean analysts’ two and one-year ahead earnings forecast scaled by the one-year ahead earnings forecast.
4.7 Econometric Issues

As a rule of thumb, according to Kennedy (1998), a VIF that is larger than 10 indicates harmful multicollinearity. In addition, a Durbin-Watson statistic that is less than 2 is an indicator of autocorrelation problem. All models were checked for multicollinearity. A high $R^2$ and few significant coefficients is not apparent in any of the models as shown in the discussion earlier.\(^{22}\) A formal multicollinearity analysis indicates low VIF in all models. None of the models show a VIF that is higher than 4. Durbin-Watson statistics for autocorrelation were also used in all models. All models have a Durbin-Watson statistic ranging between 2 and 2.5, except for Model (8), which indicates an autocorrelation problem. Following Francis et al. (2005), Model (8) is reestimated using the mean of annual regressions to solve this autocorrelation problem.

\(^{22}\) Gujarati (1998) indicates that a high $R^2$ and few significant $t$ ratios is a classical symptom of multicollinearity.
CHAPTER 5
CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

5.1 Introduction

The accounting profession has recently been affected by major financial reporting scandals and regulatory changes. The Sarbanes-Oxley Act of 2002 made changes to several engagement-specific characteristics with the ultimate aim of improving auditor independence. Accounting research is currently investigating these recent regulatory changes and how they affect the accounting profession (e.g., Francis and Wang 2005; Krishnan 2005; Krishnan et al. 2005). Although the entire accounting profession has been affected by these regulations, most accounting research focuses only on Big-audit firms. This study extends prior research that investigates the effect of accounting regulation on the accounting profession by focusing on the effect of recent regulatory changes on Second-Tier audit firms. The study uses several criteria to investigate the effect of recent accounting regulation on Second-Tier audit firms and their clients. In addition to the effect on audit fees and audit quality of Second-Tier audit firms, the study investigates the cost of capital for clients of Second-Tier audit firms. The association between ESO’s backdating and the size of the audit firm is also investigated.

In addition to providing a summary and conclusions of the study, this chapter discusses its contribution, its limitation, and potential future research opportunities.

5.2 Summary and Conclusions

This study is motivated by agency theory. The agency theory focuses on the relationship between the principal and the agent. The agent has certain obligations that he
fulfills for the principal by virtue of the economic contract between them. The audit firm plays the role of the governance mechanism between the principle and the agent that will ensure an efficient alignment of the principal’s and the agent’s interests.

This study can be divided into four main parts: the first part examines whether clients of Second-Tier audit firms incur higher audit fees subsequent to the recent accounting regulation. The second part addresses the quality of audits provided by Second-Tier audit firms. Audit quality is expected to be affected by rigid regulations and rulings in the post-SOX period. The relationship between audit quality and audit fees is also investigated. Audit fees value is expected to have an effect on the audit quality provided by the audit firm. However, it is not very easy to anticipate the direction of this association. The third part investigates whether clients of Second-Tier audit firms experience a higher cost of capital compared to clients of Big-audit firms. This study examines the relationship between clients firms that hired Second-Tier audit firms and the cost of debt and equity for these firms. The last part investigates whether there is a relationship between clients of Second-Tier audit firms and the backdating of ESOs. This study expects that clients of Second-Tier audit firms exercise backdating more often than clients of Big-audit firms.

Accounting research has expressed concerns on the recent regulatory changes and how they affect the accounting profession. There is a concern for the relationship between independent auditors and their clients in terms of audit quality, audit services, audit fees, and other variables that affect the auditor-client relationship after the implementation of these regulations (e.g., Francis and Wang 2005; Krishnan 2005; Krishnan et al. 2005). Although the entire accounting profession has been affected by these regulations, most accounting research focuses only on Big-audit firms as the major providers of high quality audit services. However, there has been very little attention devoted to Second-Tier audit firms. This study examines the
effect of regulatory changes in the accounting profession on Second-Tier audit firms. The study investigates the influence of recent accounting scandals and regulations on Second-Tier audit firms in terms of their audit fees, audit quality, and clients’ characteristics.

The first part of this study examines whether clients of Second-Tier audit firms incur higher audit fees subsequent to the recent accounting regulation, and whether this increase in audit fees is more or less compared to clients of Big-audit firms. Audit fees in the post-2002 period have substantially increased due to major SEC regulations. SOX has increased the costs associated with the internal control report requirement. Audit fees account for a substantial part of these costs associated with the implementation of SOX. Therefore, it is expected that audit fees paid to Second-Tier audit firms are higher in the post-2002 period when compared to the pre-2002 period. Results of the non-parametric tests, Binomial test and Wilcoxon signed-rank test, show that the number of client firms audited by Second-Tier audit firms reporting an increase in audit fees is significantly higher than the number of firms reporting a decrease. The audit pricing model regression results confirm the results of the non-parametric tests. The indicator variable (SOX) is significant and positive in the regression using the sample of Second-Tier audit firms in addition to sample of Big-audit firms. This shows that audit fees has increased for clients of Second-Tier audit firms as well as for clients for Big-audit firms in the post-SOX period. These findings are consistent with the hypothesis that audit fees paid by clients of Second-Tier audit firms are higher in the post-2002 period compared to the pre-2002 period. However, these findings shows that the amount of increase in audit fees paid by clients of Second-Tier audit firms is not as high as the amount of increase in audit fees paid by clients of Big-audit firms. The amount of increase in the dollar value of audit fees paid by clients of Second-Tier audit firms represents about 70 percent of the amount of increase in the dollar value of audit fees paid by clients of Big-audit firms in the post-2002 period.
The second part of this study addresses the quality of audits provided by Second-Tier audit firms, and examines the relationship between audit quality and audit fees. Auditing is considered the means of reducing information risk for users of financial statements. However, previous accounting research shows that such reduction of information risk varies from one audit firm to another based on the quality of the audit service provided. It is also argued that investors may perceive Big-audit firms as higher quality audit providers. Therefore, it is expected that there is a significant difference in audit quality between Big-audit firms and Second-Tier audit firms, where higher audit quality is associated with Big-audit firms in the post-SOX period. The results indicate that audit quality provided by Big-audit firms to their clients is higher than the audit quality provided by Second-Tier audit firms. However, the audit quality provided to clients of Second-Tier audit firms did not change in the post-SOX period. One possible explanation to this finding is that the quality of audits provided by Second-Tier audit firms has not changed significantly in the post-SOX period because Second-Tier audit firms need to sustain the level of audit quality in an effort to increase their market share. The study also shows that there is a negative association between audit fees and the audit quality provided by audit firms. This could be explained as audit fees are generally higher for more complex types of client firms. Due to their clients’ complexity, audit firms fail to provide high audit quality for their audit services, even though they have to charge higher audit fees.

One other finding worth noting is the negative association between the size of the client firm and the audit quality provided by audit firms as measured with the Dechow and Dichev (2002) model. This result shows that small client firms receive better audit quality than big client firms in the period of the study.

The third part investigates whether clients of Second-Tier audit firms experience a higher cost of capital compared to clients of Big-audit firms. Audit quality has an effect on
investors’ perception of information risk. Firms with more information risk will have higher cost of capital, where the information risk concerns the uncertainty of information desired by investors to price the expected cost of capital. Thus, the cost of capital for clients of Second-Tier audit firms is compared to the cost of capital of Big-audit firms under the context of the expected effect of the level of audit quality, where higher levels of audit quality reflect lower uncertainty of information. Since Second-Tier audit firms are expected to provide lower audit quality when compared to the audit quality provided by Big-audit firms, it is expected that their clients will have higher information risk, and hence, higher expected cost of capital.

The cost of capital is split into two components: one component is the cost of debt, and the second component is the cost of equity. The results show that clients of Second-Tier audit firms incur higher cost of debt than the cost of debt incurred by clients of Big-audit firms. However, clients of Second-Tier audit firms do not experience significant higher cost of equity when compared to clients of Big-audit firms. Four approaches for cost of equity calculation are used in the study to proxy for four different ways of calculating the implied cost of capital. The indicator variable of interest (Auditor) is not significant with the cost of equity in the PEG and the GM based models. However, the GLS and the CT based models shows positive and significant estimates for the indicator variable (Auditor). The results of the indicator variable (Auditor) is not significant with any of the cost of equity measures, which fail to support the hypothesis that cost of equity for clients of Second-Tier audit firms is higher than the cost of equity for clients of Big-audit firms. On the other hand, the audit quality variable (AuditQuality) is positive and significant in the PEG, GM, and CT based measures of cost of equity, which suggests that audit quality is associated with the cost of equity, however. These findings could be due to investors’ perception that whether the audit firm is a Second-Tier audit firms might be an irrelevant risk factor in their determination of the cost of equity, especially in
the post-2000 period, given the rigid SEC regulations. The other explanation is that investors are becoming more objective in determining the cost of equity by paying more attention to the level of audit quality provided by the audit firm rather than focusing on whether the audit firm is a Big-audit firm or a Second-Tier audit firm.

The last part of this study investigates whether there is a relationship between clients of Second-Tier audit firms and the backdating of ESOs. Results that present the cumulative abnormal return trends around ESOs grant dates for clients of Big-audit firms is more pronounced than for clients of Second-Tier audit firms during the sample period. This shows that clients of Big-audit firms backdate ESOs grants more frequently compared to clients of Second-Tier audit firms. However, results comparing pre- and post-SOX periods for clients of Second-Tier audit firms show that clients of Second-Tier audit firms in the Post-SOX period do not exercise backdating of executive stock options as it was the case in the Pre-SOX period. These findings are not consistent with the study’s hypothesis that predicts that Second-Tier audit firms’ clients exercise backdating of executive stock options more frequently than Big-audit firms’ clients.

Table 23 summarizes the results of this study. It presents the set of hypotheses tested in this study and whether they are supported or not supported.

Overall, the results reveal that audit fees paid by clients of Second-Tier audit firms are generally higher in the post-2002 period compared to the pre-2002 period. In addition, the results show that audit quality provided by Second-Tier audit firms is less than audit quality provided by Big-audit firms in the post-2002 period. However, the audit quality provided by Second-Tier audit firms did not change in the post-2002 period. The results do not show that cost of equity for clients of Second-Tier audit firms is higher than the cost of equity for clients of Big-audit firms. However, the results provide support that the cost of debt for client firms of
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis 1</td>
<td>Audit fees paid by clients of Second-Tier audit firms are higher in the post-2002 period compared to the pre-2002 period</td>
<td>Supported</td>
</tr>
<tr>
<td>Hypothesis 2a</td>
<td>Audit quality provided by Second-Tier audit firms is less than audit quality provided by Big-audit firms in the post-2002 period.</td>
<td>Supported</td>
</tr>
<tr>
<td>Hypothesis 2b</td>
<td>Audit quality provided by Second-Tier audit firms declined in the post-2002 period.</td>
<td>Not supported</td>
</tr>
<tr>
<td>Hypothesis 3a</td>
<td>Cost of debt for clients of Second-Tier audit firms is higher than cost of debt for clients of Big-audit firms.</td>
<td>Supported</td>
</tr>
<tr>
<td>Hypothesis 3b</td>
<td>Cost of equity for clients of Second-Tier audit firms is higher than cost of equity for clients of Big-audit firms.</td>
<td>Not supported</td>
</tr>
<tr>
<td>Hypothesis 4</td>
<td>Second-Tier audit firms’ clients backdate executive stock options more frequently than Big-audit firms’ clients.</td>
<td>Not supported</td>
</tr>
</tbody>
</table>
Second-Tier audit firms is higher than the cost of debt for clients of Big-audit firms. Finally, this study shows that return trends around ESOs grant dates for clients of Big-audit firms are more pronounced than for clients of Second-Tier audit firms during the sample period. However, these return trends cannot be observed in the Post-SOX period. This finding is not consistent with the hypothesis that predicts Second-Tier audit firms’ clients exercise backdating of executive stock options more frequently than Big-audit firms’ clients, but it provides important evidence on the impact of new regulations on mitigating executive opportunistic behavior associated with ESO grants for clients of Second-Tier audit firms.

5.3 Contributions

This study enhances our understanding of previous audit and financial accounting research from the perspective of Second-Tier audit firms. By examining Second-Tier audit firms and their clients, the study provides a better understanding of why some firms are more or less likely to hire a Big-audit firm versus a Second-Tier audit firm is developed.

This study is the first to directly link audit fees, audit quality, and cost of capital from a Second-Tier audit firms perspective. Companies raising capital from outside investors use independent audit firms to reduce the risk associated with investment. Audit firms increase the information available to investors and thereby reduce the risk of a given investment. Audit quality differences among audit firms are derived from their financial market effects. Accordingly, with higher quality audits, companies should have a lower cost of capital than similar companies with lower quality audits. However, audit fees paid by client firms to their audit firms affect this process.
Finally, this study should help investors and regulators better understand the issues raised by backdating of ESOs, and whether the quality of the audit provided would be able to mitigate such irregular behavior.

5.4 Limitations and Future Research

Although the results of this study might prove useful to investors, auditors, regulatory bodies, researchers, and analysts, some limitations are noted, however. First, the large sample size used in the three first parts of this study permits the detection of very small deviations from the null hypotheses. Therefore, the significant results found in this study could be partially due to the large sample effect. Second, the period where complete audit fees data is available is very short. SEC required publicly traded firms to disclose audit fees in November 2000. This period is characterized with its noisy market reaction that possibly could have affected the results of the study. Third, because audit quality is an unobservable variable, a proxy is required to apply for it. The results in this study are based on the Dechow and Dichev’s (2002) model for quality measurement and therefore are affected by the measurement error introduced by the estimation model. The study applies the modified Jones (1991) model as a supplemental measure of audit quality based on discretionary accruals. However, this measure is problematic as it is relies on the financial reporting quality. Fourth, the sample of ESOs awards is taken from Standard & Poor’s ExecuComp database. ExecuComp includes information about stock option grants from proxy statement for more than 2,000 large firms, which are or were members of the S&P 1500 (S&P 500, S&P 400 MidCap, and S&P 600 SmallCap). Most of these firms are audited by one of the Big-audit firms. This limited the backdating sample used for Second-Tier audit firms to a very small sample compared to the sample of clients audited by Big-audit firm.
Finally, although all attempts are made to control for factors that have an impact on the dependent variables used in the study, there is no certainty that all of these factors are known and susceptible of measurement.

Future research should focus on investigating other measures of audit quality. Since audit quality is an unobservable variable, future research should examine and recommend the most reliable proxy for audit quality that can correlate with true level of audit quality. This study applies the Dechow and Dichev’s (2002) model and the modified Jones (1991) model for quality measurement, which are considered financial measures for audit quality. Future research can investigate the results of this study using a market measure for audit quality, such as the e-loading (Francis et al. 2005). Finally, future studies can examine why creditors and investors react differently in terms of cost of debt and cost of equity for different types of audit firms. In other words, future research can investigate why investors do not take into account the type of audit firms with respect to the cost of equity.
Appendix A

Alternative Measures of Cost of Equity

1. *Easton (2004) PEG ratio model*

The PEG ratio approach of measuring the cost of equity suggested by Easton (2004) is based on a model of earnings and earnings growth, and is consistent with analysts’ pervasive focus on forecasts of earnings and earnings growth. Under the PEG approach, the firm specific *ex ante* cost of equity is estimated as the square root of the inverse of the price-earnings growth ratio. Specifically:

\[
CostEquity_j = \sqrt{\frac{eps_2 - eps_1}{P_0}}
\]

where, 
- \(eps_1\) = one-year ahead mean analysts’ earnings forecast per share;
- \(eps_2\) = two-year ahead mean analysts’ earnings forecast per share;
- \(P_0\) = fiscal year-end price per share

2. *Gode and Mohanram (2003)*

Gode and Mohanram (2003) use the following model in their evaluation of cost of equity:

\[
P_t = \frac{\hat{x}_{t+1} + \hat{x}_{t+2} + r_{GM} \cdot d_t - (1 + r_{GM}) \cdot \hat{x}_{t+1}}{r_{GM} \cdot r_{GM} \cdot (r_{GM} - g)}
\]

where, 
- \(P_t\) = Market price of a firm’s stock at date \(t\);
\( \hat{x}_{t, \tau} \) = Expected future earnings per share for period \( (t + \tau - 1, t + \tau) \) using either explicit analyst forecast or future earnings derived from growth forecasts \( g \),

\( g \) = Expected future growth rate;

\( d_t \) = Expected future net dividends per share for period \( t \), derived from the dividends payout ratio times the earnings per share forecast \( \hat{x}_{t, \tau} \); and

\( r \) = Implied cost of equity estimates calculated as the internal rate of return solving the above equation,

The model uses analyst forecasts of one year and two-year ahead earnings per share. Actual dividend per share and growth rate is set equal to the risk-free interest rate less 3 percent.


Gebhardt, Lee, and Swaminathan (2001) also use a special case of the residual income valuation model. Their model of cost of equity measurement is specified as follows:

\[
P_t = b_v + \frac{\hat{x}_{t+1} - r_{GLS}^{T-1} b_v + \hat{x}_{t+2} - r_{GLS}^{T-2} b_v}{(1 + r_{GLS})^2} + TV
\]

Where, \( TV = \sum_{\tau=3}^{T} \frac{\hat{x}_{t+\tau} - r_{GLS}^{\tau} b_v}{(1 + r_{GLS})^\tau} + \frac{\hat{x}_{t+T} - r_{GLS}^{T} b_v}{r_{GLS}(1 + r_{GLS})^{T-1}} b_v^{T-1} \)

\( P_t \) = Market price of a firm’s stock at date \( t \);

\( b_v \) = Book value per share at the beginning of the fiscal year;

\( b_v_{t+\tau} \) = Expected future book value per share at date \( t + \tau \), where

\[
b_v_{t+\tau} = b_v_{t+\tau-1} + \hat{x}_{t+\tau} - \hat{d}_{t+\tau}.
\]
\( \hat{x}_{t+\tau} \) = Expected future earnings per share for period \( (t + \tau - 1, t + \tau) \) using either explicit analyst forecast or future earnings derived from growth forecasts \( g \),

\( r \) = Implied cost of equity estimates calculated as the internal rate of return solving the above equation.

They use actual book values per share and forecasted earnings per share up to three years ahead to impute future expected residual income for an initial three-year period. They also assume clean surplus, that is, future book values are imputed from current book values, forecasted earnings and dividends. Dividends are set equal to a constant fraction of forecasted earnings. After the explicit forecast period of three years, the residual income series is derived by linearly fading the forecasted accounting return on equity to the sector-specific median return. They compute the historic three-year average return on equity in a given country and year for the industrial, service, and financial sectors. Negative sector-specific target returns are replaced by country-year medians. From \( T = 12 \) on, residual income is assumed to remain constant.

4. **Claus and Thomas (2001)**

Claus and Thomas (2001) apply a special case of the residual income valuation model in their evaluation of cost of equity. Their model of cost of equity measurement is specified as follows:

\[
P_i = bv_i + \sum_{\tau = 1}^{T} \frac{(\hat{x}_{t+\tau} - r_{CT}bv_{t+\tau-1})}{(1 + r_{CT})^\tau} + \frac{(\hat{x}_{t+T} - r_{CT}bv_{t+T-1})(1 + g)}{(r_{CT} - g)(1 + r_{CT})^T},
\]

\( T \) represents the explicit forecast period of three years.
where, \( P_t \) = Market price of a firm’s stock at date \( t \);

\[ bv_t = \text{Book value per share at the beginning of the fiscal year}; \]

\[ bv_{t+\tau} = \text{Expected future book value per share at date } t + \tau, \text{ where} \]

\[ bv_{t+\tau} = bv_{t+\tau-1} + \hat{x}_{t+\tau} - \hat{d}_{t+\tau}; \]

\( \hat{x}_{t+\tau} = \text{Expected future earnings per share for period } (t + \tau - 1, t + \tau) \) using either explicit analyst forecast or future earnings derived from growth forecasts \( g \),

\( g = \text{Expected future growth rate}; \)

\( r = \text{Implied cost of equity estimates calculated as the internal rate of return solving the above equation.} \)

They use actual book values per share and forecasted earnings per share up to five years ahead to derive the expected future residual income series. They define residual income as forecasted earnings per share less a cost of equity charge for beginning of fiscal year book value of equity per share. They assume clean surplus, that is, future book values are imputed from current book values, forecasted earnings, and dividends. Dividends are set equal to a constant fraction of forecasted earnings. At time \( T = 5 \), it is assumed that (nominal) residual income grows at rate \( g \) equal to the expected inflation. As a proxy for \( g \), they use the annualized median of country-specific, one-year-ahead realized monthly inflation rates. \( g \) sets a lower bound to the cost of equity estimates.
Appendix B

Converting the natural log values of audit fees to their original dollar values

To find the amount of increase in audit fees paid by clients of Second-Tier audit firms between the pre- and post-SOX periods compared to the amount of increase in audit fees paid by clients of Big-audit firms, the log values of audit fees have to be converted to their original dollar values. A confidence interval has to be constructed. The following calculation is applied:

\[ \ln(\text{FEE}) \text{ increases by } \beta_1 \text{ after SOX for both samples of Second-Tier audit firms and Big-audit firms.} \]

Therefore, FEE increases by \( e^{\beta_1} \).

The amount of increase in FEE paid by clients of Second-Tier audit firms between the pre- and post-SOX periods = \( e^{0.372} = 1.45 \); and

The amount of increase in FEE paid by clients of Big-audit firms between the pre- and post-SOX periods = \( e^{0.718} = 2.05 \).

Therefore, the amount of increase in audit fees paid by clients of Second-Tier audit firms between the pre- and post-SOX periods compared to the amount of increase in audit fees paid by clients of Big-audit firms is on average equal to \( \frac{1.45}{2.05} \), which is equal to 0.70.

A confidence interval for this ratio is calculated as follows:

A 95 percent confidence interval on \( \beta_1 : \beta_1 \pm t\sigma_{\beta_1} = (a,b) \)
Therefore, a 95 percent confidence interval on FEE: \((e^a, e^b)\)

A 95 percent confidence interval on \(\beta_1\) for Second-Tier audit firms: \(\beta_1 \pm t\sigma_{\beta_1}\)

\[= \beta_1 \pm 1.96\sigma_{\beta_1}\]
\[= 0.372 \pm 1.96(0.02364)\]
\[= 0.372 \pm 0.0463\]
\[(0.33, 0.42)\]

Therefore, a 95 percent confidence interval on \(e^{\beta_1}\) for Second-Tier audit firms:

\[= (e^{0.33}, e^{0.42})\]
\[= (1.39, 1.52)\]

Similarly, a 95 percent confidence interval on \(\beta_1\) for Big-audit firms: \(\beta_1 \pm t\sigma_{\beta_1}\)

\[= \beta_1 \pm 1.96\sigma_{\beta_1}\]
\[= 0.718 \pm 1.96(0.01108)\]
\[= 0.718 \pm 0.0217\]
\[(0.70, 0.74)\]

Therefore, a 95 percent confidence interval on the exponential \(e^{\beta_1}\) for Big-audit firms:

\[= (e^{0.70}, e^{0.74})\]
\[= (2.01, 2.10)\]

Since the samples are independent,

\[P(A \cap B) = P(A) \cdot P(B)\]

Therefore, the confidence interval on the ratio = \((0.95),(0.95) = 0.9025\)
A 90.25 percent confidence interval for amount of increase in audit fees paid by clients of Second-Tier audit firms between the pre- and post-SOX periods compared to the amount of increase in audit fees paid by clients of Big-audit firms is

\[
\begin{pmatrix}
1.39 & 1.52 \\
2.01 & 2.10
\end{pmatrix}
\]  

\[= (0.69, 0.72)\]
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