THE IMPACT OF THE SARBANES-OXLEY ACT OF 2000 ON THE U. S. FINANCIAL MARKETS

by

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ABSTRACT

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This dissertation examines the impact of the Sarbanes-Oxley Act (SOX) on the U. S. financial markets by investigating three topics: security analysts' performance, security analyst monitoring activity and firm value, and the cost of equity capital. Each topic is presented in a separate essay.

In the first essay, the impact of SOX on security analysts' performance is investigated. The findings indicate that security analysts' forecasting performance has deteriorated post-SOX for both large and small firms. In addition, this deterioration in forecasting performance holds across industries. Security analysts have also become pessimistic in their earnings forecasts post-SOX.

The second essay examines the effect of SOX on security analysts' monitoring activity and firm value. Results indicate that firm value has increased for all firms in the sample, while analysts' monitoring activity has decreased. This result is not surprising as the legislation itself acts as a monitoring mechanism that reduces the need for security analysts' monitoring activity. Moreover, the increase in firm value is more significant for the group of small firms.

Finally, the third essay investigates the impact of SOX on firms' cost of equity capital. Findings show that the cost of equity capital has decreased post-SOX. Based on firm size quartiles, the smallest decrease in the cost of equity capital is manifested in the smallest and largest groups of firms.

Overall, the evidence presented in these three studies is supportive of the view that SOX has had a positive impact on public firms.

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CHAPTER 1

INTRODUCTION

1.1 Importance of the Study

The financial markets play a significant role in the overall economic growth of the United States (U.S.). The efficiency of these financial markets is a very important consideration for corporations, investors, the government, and indeed all market players. To a large extent, this efficiency is directly linked to the validity and accuracy of the information provided by corporations' financial reporting and corporate governance systems.

After the accounting scandal at Enron became public in 2001, as well as other major financial meltdowns by corporations such as WorldCom, Adelphia and Tyco, the federal government felt justified in responding firmly. To this end, the U.S. Congress passed the Sarbanes-Oxley Act (hereafter, SOX or the Act) on July 25, 2002.[1] It has been deemed the most serious piece of legislation in recent years to affect financial disclosure, corporate governance and public accounting. Without a doubt, its emphasis is on the provision of accurate information to all market players. In signing the Act into law, President Bush referred to it as "the most far-reaching reform of American

[1] Sarbanes-Oxley Act of 2002, Pub. L. No. 107-204, 116 Stat. 745.

business practices since the time of Franklin Delano Roosevelt."[2] Its primary aim is to improve the quality of financial reporting and corporate governance and, in so doing, restore and strengthen investors' confidence in the financial markets. Therefore, the Act forces public companies to be more vigilant and transparent in their business activities, particularly in their financial reporting.

All publicly traded companies in the U.S. must comply with SOX. In addition, all private companies preparing for an initial public offering (IPO) need to comply with certain provisions of SOX. The new law established new accountability standards for corporate boards and auditors, and specified civil action penalties for noncompliance. It also established the Public Company Accounting Oversight Board (PCAOB) under the umbrella of the Securities and Exchange Commission (SEC). The PCAOB oversees the auditors of public companies with the aim of protecting investors' interests and promoting transparent and independent audit reports. Essentially, SOX mandates that U.S. public firms implement stricter financial and corporate governance practices.

There has been an outcry against the legislation as many corporate insiders and business groups believe that the U.S. is losing its leading competitive position as a direct result of the considerable regulatory compliance costs and liability risk associated with SOX. The Committee on Capital Markets Regulations' report, released on November 30, 2006, addressed the notion that "excessive regulation is adding to corporate costs, stifling the public securities markets, and causing the U.S. to lose

[2] See the White House Presidential News and Speeches, http://www.whitehouse.gov/news/releases/2002/07.

business to foreign competitors."[3] Proponents of the law, however, argue that by taking care of past corruption, the law leads to increased investor confidence and by extension, higher rates of investment.

At present, published research dealing with SOX and its impact on the financial markets is limited. Piotroski and Srinivasan (2007) examine the impact of the Act on the flow of international listings. They find that U.S. exchanges have experienced a reduced frequency of foreign listings. Doidge et al. (2007) investigate the causes and consequences of cross-listings on the New York and London stock exchanges from 1990 to 2005. They conclude that the benefits that are inherent in a New York stock exchange listing have not disappeared as a result of SOX, and that these special governance benefits enjoyed by foreign firms are not found in the London listings. Jain and Rezaee (2006) examine the impact of the Act on security market behavior. The authors find that the Act was wealth increasing, and market reaction was more positive for more compliant firms with effective corporate governance, transparent financial reporting, and reliable audit functions. Zhang (2007) investigates the economic consequences of the Act and finds that the cumulative abnormal return around all legislative events surrounding the passage of the Act is significantly negative and that compliance is costly to businesses. Li (2007) investigates the impact of SOX on cross-listed foreign private issuers (FPIs) and concludes that FPIs experience abnormal stock

[3] For more information on this committee, go to http://www.capmktsreg.org/.

returns of about -10% after the enactment of SOX. The author also finds that the Act imposes inordinate costs on cross-listed FPIs.

This dissertation attempts to shed new light on the impact of SOX on U. S. financial markets. I endeavor to accomplish this by investigating three primary questions. First, what changes have there been in security analysts' performance since the implementation of the Act? If the provisions of the Act have helped security analysts in making more accurate earnings forecasts, then presumably this will be reflected in a reduction in the forecast error and forecast bias.

The second question that is examined is the following: How has the Act impacted security analysts' monitoring activity and firm value, including the traditional relationship between the two? If the legislation is having a positive impact on public firms (i.e., more accurate financial reporting and improved corporate governance systems), then an increase in firm value and monitoring activity is expected. Studies relating security analysts' monitoring activity and firm value exist in the literature (Chung and Jo (1996)). However, this study is the first to investigate how the relationship has changed post-SOX.

The third question that is examined is related to one of the most fundamental components in corporate financial decision making - the cost of equity capital. Specifically, how has the implementation of SOX impacted the cost of equity capital? Prior research has examined the cost of equity capital in depth (Diamond and Verrecchia (1991), Botosan (1997), and Botosan and Plumlee (2002). Given its importance, an investigation of the cost of equity capital post-SOX is pertinent.

Taken together, the three questions highlighted above will add new insight into the impact of SOX on various aspects of the financial markets. The study will also add to the body of work dealing with corporate governance and legislation and how these areas affect the efficiency of public firms, and the financial markets in general. This is important especially with the ongoing debate about the role of legislation in the financial markets.

1.2 Background

In this section, the components of the Act and the rationale for its enactment will be reviewed. In addition, the purpose and scope of the study, research questions, and the significance of the study will be amplified.

1.2.1 SOX Act of 2002

Congress passed the Sox Act of 2002 as a direct result of corporate scandals that included bankruptcies, inadequate accounting practices, and inefficient audit firms that chose to ignore these practices. It began with Enron's bankruptcy in December 2001.[4] However, this was soon followed by other well-known firms, such as WorldCom, Adelphia, and Tyco, disclosing major accounting irregularities.[5] The dire financial impact on households was presumably too great for the government to ignore, and Congress hurriedly passed the SOX legislation on July 25, 2002. The Act was intended

[4] *Events in the Enron Case*, The Wall Street Journal, Mar 8, 2006.
[5] Simon Romero and Alex Berenson, *WorldCom Says It Hid Expenses, Inflating Cash Flow $3.8 Billion*, NY Times, June 26, 2002.

to improve the reliability of financial reporting, fight fraud, and perhaps most importantly, restore investor confidence.

1.2.2 The Components of SOX

The Act is organized into eleven sections, but the main components of SOX include disclosure and reporting; increased auditor independence and reduced analyst conflict of interest; encouragement and protection of reporting of misconduct; and punishment and deterrence. All of these sections can have a direct and immediate impact on the information environment at public companies. Moreover, they can specifically affect the quality of the information that is disseminated, and top management is held accountable for the accuracy of the information. Therefore, whereas Regulation Fair Disclosure (Reg FD) dealt exclusively with the manner in which information is shared, SOX deals with the quality of the information that is shared. Reg FD was adopted by the Securities and Exchange Commission (SEC) in October 2000 to curb the selective disclosure of nonpublic information by firms. It fundamentally changed the way firms communicated with investors.

1.2.2.1 Reporting and Disclosure

One of the explicitly stated purposes of SOX is improved disclosure and reporting.[6] The different titles and sections of the Act aim to increase disclosure as well as the scope of individuals whose job it is to make such disclosures. Moreover, these disclosures have been broadened with the objective of increasing transparency for investors. Corporate tax returns must now be signed by the Chief Executive Officer

(CEO), and annual reports must include an internal control report that specifically states that management is responsible for establishing, maintaining, and assessing the internal control structure and procedures for financial reporting. Also, the company's auditors must vouch for, and report on, the assessment made by the management of the company. The Public Company Accounting Oversight Board (PCAOB) oversees the audit of public companies, and any violations are deemed a violation of the Act.

1.2.2.2 Increased Auditor Independence and Reduced Conflicts of Interest

The primary objective here is to increase the independence and reduce conflicts of interest of various market players. Auditors undertaking SOX audits cannot perform non-audit services unless given permission by the PCAOB. In addition, an audit committee must be established and is responsible for any work performed by a registered public accounting firm. Every member of the company's audit committee must also be a member of the company's board of directors and must be independent. There must be a publicized code of ethics for senior financial advisors and an explanation should a company not have the code of ethics. The Act also prevents a company from extending credit to directors and executives, directly or indirectly, except when a company is explicitly in the business of providing credit.

As part of this area, there is Section 404 of the Act. Section 404 requires management and their independent auditors to present two distinct assessments of a company's internal control over financial reporting. In order for a company's management to make definitive evaluations on the effectiveness of the company's

[6] Sarbanes-Oxley Act of 2002, *supra* note 1.

internal controls, management must document, evaluate and test controls that are pertinent to the financial reporting process. Incidentally, costs for implementing this Section have been deemed to be very high.

1.2.2.3 Encouragement and Protection of Reporting of Misconduct

The Act mandates that company attorneys report any evidence of "material violation of the securities law or breach of fiduciary duty or similar violation by the company or any agent."[7] Also, the audit committee must implement procedures for the receipt, retention and treatment of complaints received associated with accounting, internal controls and auditing. The whistleblower protection provisions (sections 806 and 1107) provide protection from retaliation to employees by employers when an employee lawfully reveals information about an employer in the investigation or prosecution of a fraud claim.

1.2.2.4 Punishment and Deterrence

Titles VIII, IX and XI outline the penalties for lack of compliance with SOX, as well as Federal or State securities laws. SOX has broadened the SEC's oversight and enforcement authority, and the Commission plays a key role in ensuring the proper implementation and enforcement of the mandates of the Act. The SEC has authority over the PCAOB, and also has complete authority to bring a civil action against a company or agent that inappropriately influences auditors. Penalties for noncompliance could range from $1 million to $5 million dollars and 10 to 20 years in prison.

1.2.3 Reaction to SOX

Reaction to SOX can be divided into two categories: (1) reaction by investors; and (2) reaction by corporate insiders and business groups. The former lobbied aggressively for the strict implementation of the Act, while the latter lobbied just as aggressively against the Act's strict implementation. Investors, and other proponents of the Act, were of the view that SOX's main objective of improving the quality of financial reporting would benefit companies' governance and management, thereby increasing investor confidence and protecting the capital markets. Misconduct by insiders would be reduced because of increased transparency, and the benefits would certainly outweigh the costs. Essentially, investors felt that the Act would foster growth, increase confidence in the capitalist system, and encourage wise risk-taking. This, in turn, would lead to higher rates of investment and economic progress. On the other hand, corporate insiders, business groups, and other detractors of the Act felt that the law was hurriedly passed. It would be ineffective in preventing misconduct, and the benefits and costs were not adequately assessed. In addition, they felt that the Act was burdensome and the compliance costs were too exorbitant. According to the opponents of the law, this would be especially true in the case of small businesses. While larger businesses would have the necessary resources to comply, smaller businesses would find it extremely burdensome to comply.[8] A study conducted by CRA International, a Boston based research and consulting firm, found that the average cost of complying

[7] Id. § 7245 (Supp. III 2003).

with only Section 404 of SOX in 2004 was $8.5 million for large companies (market capitalization of $700 million or more), and $1.2 million for companies with a market capitalization in the range of $75 million to $700 million.[9] Companies with a market capitalization below this range are not required to comply as yet. Essentially, the corporate insiders and business groups felt that SOX was an example of poorly designed corporate legislation that would discourage risk taking, hinder innovation and productivity, thereby thwarting economic growth.[10]

1.3 Contribution of the Study

This study is the first to investigate changes in security analysts' forecast performance and the cost of equity capital post-SOX. Also, it is the first to examine changes in the traditional positive relationship between security analysts' monitoring activity and firm value. The research will provide important information to corporate insiders, investors, security analysts, and indeed all market participants. The hypotheses are presented below.

1.3.1 Security Analysts' Performance Hypotheses

The first hypothesis is that security analysts' forecasting performance has improved post-SOX. In other words, the earnings forecast errors and forecast bias have decreased. The second hypothesis is that any changes in security analysts' forecasting

[8] See Kara Scannell and David Reilly, *Small Firms' Sarbanes Suffering?* Wall Street Journal, April 6, 2006, at C1.
[9] *Sarbanes-Oxley Section 404 Costs and Implementation Issues*, Charles River Associates, April 2005, http://www.crai.com/Showpubs.asp?Pubid=4896.

performance has changed more for small firms than large firms. The third hypothesis is that changes in security analysts' forecasting performance are more pronounced in the technology and consumer services industry sectors than in other sectors. These hypotheses suggest that SOX has created an improved information environment which security analysts can use in helping them make their forecasts. They also suggest that SOX has improved security analysts' forecasting performance in areas that have been traditionally difficult to forecast (e.g., small firms and firms in the technology and consumer services sectors).

1.3.2 Security Analysts' Monitoring Activity and Firm Value Hypotheses

The first hypothesis is that security analysts' monitoring activity has decreased post-SOX. The second hypothesis is that firm value has increased post-SOX. This suggests that even though the traditional association between security analysts' monitoring activity and firm value is a positive one, the implementation of SOX acts as a monitoring mechanism, reducing the need for security analysts' monitoring activity. The third hypothesis is that any changes in security analysts' monitoring activity and firm value post-SOX are more significant for small firms than for large firms. This suggests that small firms stand to benefit more from the Act than large firms.

1.3.3 Cost of Equity Capital Hypotheses

The first hypothesis is that the cost of equity capital has decreased post-SOX. The second hypothesis is that changes in the cost of equity capital will be more

[10] Scott Green, *The Limitations of the Sarbanes-Oxley Act*, USA Today (New York), Volume 133, Issue 2718, March 1, 2005.

pronounced for smaller firms post-SOX than for larger firms. This suggests that SOX has had a positive effect on improving investor confidence and on reducing the perceived risk of firms.

1.4 Organization of Dissertation

This dissertation will provide a three-essay approach with one chapter per essay. Each chapter reviews the relevant research, identifies the contributions to the literature, and describes the data and methodology used. In addition, each chapter will present and interpret the empirical findings, and conclude with a summary and the implications of the results. The impact of SOX on security analysts' performance is presented in Chapter 2. Chapter 3 presents the impact of SOX on security analysts' monitoring activity and firm value, and Chapter 4 presents the impact of SOX on the cost of equity capital. Overall summary and conclusions are presented in Chapter 5, along with areas for future research.

CHAPTER 2

SECURITY ANALYSTS' PERFORMANCE

2.1 Introduction

This study investigates the impact of SOX on financial analysts' forecasting performance. Specifically, the study will examine whether analyst earnings forecasts are more accurate since the passage of the Act, given the fact that the primary aim of the Act is to increase the accuracy and quality of information. Analysts' performance has been thoroughly researched over the years, and more recently with the passage of Regulation Fair Disclosure (hereafter, Reg FD). Incidentally, the goal of Reg FD (effective October 23, 2000) was to ensure equal access to information by requiring public disclosure of information to all market participants at the same time. However, there doesn't appear to be any research at this time, which looks directly at analysts' forecast performance post SOX. Since the Act is geared towards improving the quality of information-gathering and dissemination activities of public companies, it directly impacts the work of security analysts, and warrants empirical analysis.

Financial analysts play a very important role in our economy. They analyze complex company information and present it in a way that makes it easier for investors, and other market participants, to understand and make key financial decisions. In essence, they act as information intermediaries between companies and investors

(Chung and Jo (1996)). Research has shown that forecasts and recommendations made by financial analysts affect stock prices and the market value of firms, so their role in financial markets cannot be diminished (Francis and Soffer (1997), Chung and Jo (1996), and Givoly and Lakonishok (1979)). These analysts rely almost entirely on the information provided by companies to make their forecasts, and market participants in turn rely on them to guide their investment decisions. Therefore, considering the main objective of SOX lies in increasing the accuracy of information, which includes the accuracy of financial reporting and better corporate governance, security analysts should now have access to more accurate and credible information on which to base their forecasts if SOX is indeed meeting its objectives. Some recent studies by finance and accounting academics seem to suggest that SOX may actually be achieving its objectives, and despite the high costs of compliance, the Act has improved both the quality and quantity of corporate disclosure.[11] However, other studies conclude that management reporting behavior has become more conservative, and the quality of the information environment may have decreased post-SOX (Lobo and Zhou (2006)). This analysis helps in understanding whether SOX is actually achieving its objectives by providing security analysts, and by extension, all market participants with a more reliable information set. In other words, is the information environment a better one as a result of SOX?

Three main hypotheses are examined. The first is that analysts' earnings forecast errors have decreased since the enactment of SOX. In other words, forecast

[11] Robert Prentice, *Sarbanes Has Improved Quality of Corporate Disclosure*, CIO Insight, July 30, 2007.

accuracy has improved since the passage of the various components of the Act. The components of the Act are such that it aims to significantly improve the quality of information that is being disseminated by public companies. Indeed, if the quality of the financial information environment is improving, then this should have a positive effect on security analysts and their performance. If the opposite holds true, and there has been a reduction in the quality of the information environment post-SOX because, for example, management has become more conservative in their corporate reporting, then there should be a decrease in the forecast accuracy.

The second hypothesis centers on small firms. It is hypothesized that any improvements in analysts' forecast accuracy should be more pronounced for small firms than for large firms following the enactment of SOX because of two main reasons. First, relative to large firms, small firms are usually characterized by poor information environments (Francis et al (1997)). Given that SOX aims to encourage a more informationally efficient market, it is expected that any improvements in security analysts' performance would be greater for small firms than for large firms unless the information environment has not improved post-SOX. Second, the potential benefits of a better information environment may be higher for small firms because of the increased transparency and more accurate financial reporting that are not usually inherent in small firms. These factors lead one to believe that if SOX has actually created a better information environment, then any impact on security analysts' performance would be seen more clearly in small firms as these firms have not traditionally enjoyed a high quality information environment.

The third hypothesis investigates the industry effect of SOX. Examining this issue is very important since market players are interested in understanding how the legislation affects firms in different industries, especially firms in those industries which analysts traditionally have difficulty in forecasting earnings. Previous studies (e.g., Clement (1999) and Hutton (2003)) note that the information environment may differ across industries, and that analysts find it more difficult to forecast earnings for firms which are characterized by a high level of intangible assets. Agrawal et al. (2006) postulated that firms in the technology and consumer services sectors seem to fit that characterization. Consistent with their research and the objectives of SOX, it is hypothesized that the effect of SOX on security analysts' forecast accuracy should be more pronounced in these two sectors if there have indeed been definite improvements in the information environment post-SOX.

In addition to the aforementioned hypotheses, the study also looked at the impact of SOX on security analysts' performance during the early post-SOX period versus later in the post-SOX period.

2.1.1 Organization

Section 2.2 reviews relevant previous research and presents this essay's contribution to the literature. Section 2.3 describes the data and methodology. Section 2.4 presents the empirical results as well as related findings, and Section 2.5 presents the conclusions and implications.

2.2 Literature Review

2.2.1 Analysts' Use of Information

Scholars and practitioners agree that security analysts are probably the most influential information intermediaries in the financial system. Their primary function is to collect and analyze large quantities of information from a number of different firms, and then make this information available to investors in a way that is easily understandable to aid in their decision making.

Ceteris paribus, superior information quality should have a positive impact on forecast accuracy. Kross et al. (1990) report that security analysts enjoy an advantage that increases with better information-gathering and dissemination techniques used by analysts and firms alike. Lang and Lundholm (1996) and Barron and Stuerke (1998) used forecast dispersion among analysts as a proxy for information asymmetry. A high level of dispersion is indicative of low consensus among analysts' forecasts, which translates into high information asymmetry. The information gleaned from consensus forecasts is very important to researchers, investors and indeed all market players as it is used in economic and investment models, as well as in formulating buy and sell decisions for securities. Its influence on stock prices has also been well documented (Brown and Rozeff (1978), Rozeff (1983), Chung and Jo (1996)). In addition, there is a wealth of evidence concurring with the belief that financial analysts play a key role in maintaining the information efficiency of the financial markets (Moyer et al (1989)).

2.2.2 Analysts' Performance

One of the primary objectives of SOX is to restore investors' confidence in the markets by improving the accuracy of financial and other corporate information released by public firms. Dreman and Berry (1995) report that accurate earnings estimates are imperative to most contemporary stock valuation models. These models rely on the ability of security analysts to forecast earnings accurately. However, the authors report that analysts' forecast errors are consistently too large for many valuation models to produce credible results. In addition, several studies on analysts' earnings forecasts provide evidence that analysts consistently make biased forecasts, and they misinterpret new information. Dreman and Berry (1995), Kang et al. (1994), Francis and Philbrick (1993), and Brous (1992) all report that analysts produce upwardly biased forecasts. Teoh and Wong (1997), Elliot et al. (1995), Ali et al. (1992), Abarbanell and Bernard (1992) and Abarbanell (1991) all provide evidence that analysts systematically underreact to new information. Barberis et al. (1997) build a model with the foundation in the psychology of decision making and based on the concepts of "representativeness" and "conservatism". They define "representativeness" as investors and analysts who ignore the laws of probability and behave as though the events they have observed are typical of the earnings or return generating process. They define "conservatism" as investors and analysts who are slow to update their prior beliefs in response to new information. According to the authors, these two behavioral tendencies lead to underreaction in some situations, and overreaction in others. Likewise, DeBondt and Thaler (1990) provide conflicting evidence that analysts systematically overreact to new

information. Easterwood and Nutt (1999) report that systematic underreaction or overreaction is perceived as being inconsistent with rational forecasts as well as efficient markets for unbiased information. To the extent that SOX directly addresses the quality and accuracy of corporate disclosures, this study aims to examine whether there has been a decrease in forecasting errors post-SOX.

2.2.3 Large Firms vs. Small Firms

It is reasonable to expect that the impact on small firms as a result of the enactment of SOX would be different from the impact on larger firms. This can be attributed primarily to the costs of compliance with SOX, as well as the possible benefits of SOX, which have been deemed greater for small firms than their larger counterparts.[12] The main objective of SOX is to restore (and improve) investor confidence by increasing the transparency of all financial activities of public companies. Doyle et al. (2007) document that meeting this objective would be especially beneficial to small firms since their limited accounting personnel, as well as their limited exposure to public scrutiny, make their financial statements prone to inaccuracies.

The inherent nature of SOX suggests that the legislation should enhance the information environment for all firms, but particularly for smaller firms. Prior to the enactment of the legislation, it can be assumed that less accurate information was available to security analysts and investors for small firms. Likewise, given the

[12] See Kamar et al, *Sarbanes-Oxley's Effects on Small Firms: What is the Evidence?,* Working Paper, June 2007.

complexity of larger firms, it can also be argued that SOX plays a very important role in providing more accurate and transparent information for analysts and investors alike.

Information is one of the main assets that financial analysts have in fulfilling their roles, and firm size has been well documented as an important characteristic of the information environment. Researchers posit that more information is associated with larger firms because smaller firms are generally associated with poorer information environments (Grant (1980), Collins et al. (1987), and Bhushan (1989)). Moreover, Atiase (1985) reports that there is an inverse relationship between firm size and the amount of unexpected information communicated to the market by actual earnings reports. Thus, it has been suggested that firm size is inversely correlated with forecast error and bias since the amount and quality of information provided by large firms is greater than that of smaller firms (Beckers et al. (2004)). In examining managerial behavior and the bias in analysts' earnings forecasts, Brown (1998) concludes that small firms have more optimistic bias mainly because they are more likely to record losses, and also because the managers of these smaller firms are less likely to be engaged in managing profits. Hutton (2003) asserts that financial analysts find it more difficult to forecast the earnings of firms (large or small) with a high proportion of intangible assets, or when business and financial transactions are sufficiently complex.

2.2.4 Analysts' Performance Across Industries

Prior studies have found that security analysts' performance differs across industries. In examining the relationship between analysts' forecast accuracy and analyst ability, resources and portfolio complexity, Clement (1999) conjectures that the

information environment differs across industries and analyst forecast errors reflect that belief. Hong and Kubik (2003) investigated security analysts' career concerns by linking their earnings forecasts to job separations. In their study, the authors also note that security analysts' forecast errors differ across firms/industries because different industries are characterized by different information environments. In examining the determinants and consequences of managerial earnings guidance prior to Reg FD, Hutton (2003) find that managers provided more detailed guidance when earnings were important to valuation but harder to forecast, when the firm had many business segments, and a high proportion of intangible assets. Against this backdrop, a look at the industry effect in the context of this study is warranted.

2.2.5 Contributions to the Literature

This study is related to recent examinations of security analysts' performance after the adoption of regulations (e.g., Reg FD), with a specific look at the level of their forecast errors (Agrawal et al. (2006); Findlay and Mathew (2006)). This research differs from previous research in the following ways. First, the study posits that the information provided by companies after the enactment of SOX should be of a higher quality as a direct result of the specific requirements of the Act. Therefore, security analysts should have an improved information set available to make their forecasts. Second, this analysis further investigates whether there are any differences in the accuracy of analysts' forecasts between large companies and small companies, as defined by their market capitalization, following the enactment of SOX. The Act's impact on small companies has been a major source of contention by participants in the

financial markets, and the focus on analysts' performance as it relates to firm size post-SOX will provide valuable information to the existing literature. Third, the study examines the industry effect of SOX. Previous research has shown that the information environment differs across industries. Therefore, given that SOX looks specifically at improving information accuracy and the financial information environment, the study will provide key information to the literature on financial analysts' performance as it relates to firms in specific industries post-SOX.

This study contributes to the body of research, which examines the importance of security analysts as players in the financial system, and the impact that new legislation has on their performance. There has been extensive research dealing with security analysts' performance after the implementation of Reg FD; however, there is a gap in the literature looking at security analysts' performance after the enactment of SOX. This research is important because of the sheer nature of the Act – deemed the most extensive piece of legislation to impact all financial aspects of public companies. In addition, the results are of interest to the SEC, corporate insiders and business groups, as well as investors who all have a stake in the consequences of SOX.

2.3 Data and Methodology

2.3.1 Description of Data and Sample Selection

The financial data for this study come from the Institutional Brokers Estimate System (I/B/E/S) and COMPUSTAT. Specifically, earnings forecast data (obtained from I/B/E/S) are analyzed for quarters ending between March 1996 and December

2006 for firms in the S&P 500 Index and S&P Small Cap 600 Index. The use of these two indices allows for the control of various firm characteristics such as the information environment and firm size. The S&P 500 is widely respected as the best single indicator of the U.S. equities market, and includes a representative sample of 500 leading companies in various industries of the U. S. economy with a minimum market capitalization of US$5 billion. The S&P Small Cap 600 is a reputable small cap index in the U.S. that is structured specifically to comprise an efficient portfolio of companies with a market capitalization between US$300 million and US$2 billion.[13] Industry information, including the sector/industry/group (SIG) sectors, is also obtained from I/B/E/S.

The time period under review provides 44 consecutive quarters of data. The longer time horizon should limit the sensitivity of the results to any macroeconomic shocks in the economy (Keane et al. (1988) and O'Brien (1994)). Other data on firm characteristics (earnings and number of company executives) come from COMPUSTAT. Following Heflin, Subramanyam and Zhang (2003), the impact of SOX on the accuracy of financial analysts' consensus earnings forecasts by investigating pre- and post-SOX quarterly earnings estimates is examined. The pre-SOX period includes quarters ending between March 1996 and September 2002, and the post-SOX period extends from quarters ending December 2002 to December 2006. In order to be consistent and to match calendar and fiscal quarters, the sample is limited

[13] For further information on these two indices, including a detailed fact sheet, see http://www2.standardandpoors.com.

to firms having December fiscal year ends. For all forecasts, matching actual earnings data was required as well as data on the firm characteristics. In addition, one-quarter ahead forecasts over the zero-horizon forecasts are examined in accordance with Mohanty and Aw (2006). The zero-horizon forecasts are defined as the most recent earnings forecasts made before the announcement of the actual earnings. This forecast period is important because as one gets closer to the earnings release, security analysts should have more information at their disposal and forecasts should become more accurate.

The final sample of 11,153 observations, representing 175 S&P 500 firms and 79 S&P 600 firms, include all December fiscal year-end firms with the following data in all quarters of the sample: (1) actual earnings per share (EPS); (2) consensus EPS forecasts; (3) number of analysts; and (4) number of company executives. Approximately 39 percent of the observations of earnings forecasts are during the post-SOX period; 31 percent of the observations represent small firms; and 42 percent of the observations represent consumer services (SIG Code 04) and technology firms (SIG Code 08). The other industries represented include finance, healthcare, consumer nondurables, consumer durables, energy, transportation, basic industries, capital goods, and public utilities.[14]

2.3.2 Methodology

2.3.2.1 Univariate Tests

In prior studies, analyst forecast accuracy has been measured as the absolute forecast error, scaled by the absolute value of actual earnings (e.g., Dreman and Berry (1995), and Beckers et al. (2004)). In this study, for the consensus forecasts, the absolute normalized forecast error (ANFE) for company *j* for forecast period *t* is defined as follows:

$$\text{ANFE}_{jt} = |\tilde{eps}_{jt} - eps_{jt}| / |eps_{jt}|, \quad (1)$$

where $\tilde{eps}_{jt}$ equals the consensus forecast EPS for company *j* for quarter *t*, and eps_{jt} equals the actual EPS for company *j* for quarter *t*. The following steps were also taken: First, in order to avoid division by zero, actual EPS observations equal to zero were omitted from the sample. Second, in order to minimize the effect that extreme observations may have on any inferences, forecast errors with values greater than two are omitted.

Many studies find that security analysts are usually optimistic in their forecasts (Easterwood and Nutt (1999), Butler and Lang (1991), and O'Brien (1988). To investigate the persistent direction of the forecast errors, or the forecast optimism or pessimism, the forecast bias for company *j* for forecast period *t* is defined as follows:

$$\text{FB}_{jt} = \tilde{eps}_{jt} - eps_{jt} / |eps_{jt}| \quad (2)$$

[14] These are specified in the Institutional Brokers Estimate System (I/B/E/S).

2.3.2.2 Multivariate Tests

There are many factors other than SOX, such as firm characteristics, that can affect the accuracy of security analysts' forecasts. However, in this study, the primary concern is in investigating the impact of SOX on security analyst forecast performance. As such, a model with firm fixed effects is used here to isolate the effect of SOX on security analysts' forecast errors while controlling for firm characteristics.[15] This model is appropriate because there are no significant firm differences, but there might be autocorrelation due to time-lagged temporal effects. In other words, the variables are homogenous across the firms. The model is similar to Agrawal et al. (2006), and consistent with their study, robust *t*-statistics from a heteroskedasticity-autocorrelation consistent estimator are reported. First, the following fixed-effects regressions are estimated:

$$\begin{aligned} \text{ANFE}_{jt} = {} & b_0 + b_1 \text{POSTSOX}_t + b_2 \text{DISP}_{jt} + b_3 \text{LNAN}_{jt} + b_4 \text{LNEXEC}_{jt} \\ & + b_5 \text{EVOL}_{jt} + b_6 \text{LOSS}_{jt} + u_{jt}, \end{aligned} \tag{3a}$$

$$\begin{aligned} \text{FB}_{jt} = {} & b_0 + b_1 \text{POSTSOX}_t + b_2 \text{DISP}_{jt} + b_3 \text{LNAN}_{jt} + b_4 \text{LNEXEC}_{jt} \\ & + b_5 \text{EVOL}_{jt} + b_6 \text{LOSS}_{jt} + u_{jt}, \end{aligned} \tag{3b}$$

where ANFE and FB are defined according to Section 4.2.1 above. The dummy variable, POSTSOX_t, is equal to one if the forecast period is within the post-SOX period and zero otherwise. A positive coefficient on POSTSOX would indicate that analyst forecast errors increased after the enactment of SOX (i.e., a decrease in

accuracy), while a negative coefficient would indicate a decrease in the forecast errors indicating an improvement in accuracy. In terms of the forecast bias, a positive coefficient on POSTSOX would indicate that security analysts have become more optimistic in their forecasts post-SOX, while a negative coefficient would indicate pessimism in earnings forecasts post-SOX. Ideally, one would like to see a coefficient closer to zero indicating that security analysts are becoming more accurate in their forecasts. Prior studies find that dispersion (DISP), number of analysts (LNAN), number of company executives (LNEXEC), earnings volatility (EVOL), as well as profits and losses (LOSS) are related to forecast accuracy. Therefore, these variables are controlled for in the model. Following Chung et al. (1995) and Morse et al. (1991), the variable $DISP_{jt}$ is measured as the coefficient of variation of the consensus forecasts (i.e., the standard deviation of the consensus forecast earnings over the quarter normalized by the mean consensus forecast). A positive coefficient on this variable is expected implying that as analyst disagreement on estimates increase, forecast errors and forecast bias also increase. As a result of the skewness of the number of analysts and number of company executives, the logarithm measures (LNAN and LNEXEC) are used in the regressions. It is expected that forecast error would decrease with an increasing number of analysts, indicating a negative coefficient on LNAN. Lundtofte (2006) showed that there are three types of information agents (executives, stockbrokers, and small investors) representing three levels of information quality. He posited that the executive is the fully informed agent who understands the true

[15] See Wooldridge (2002) for a thorough examination of the fixed-effects model.

dynamics of the economy and has the most accurate and complete information set. Using this analysis, it is postulated that the number of company executives would have a positive impact on forecast accuracy if the executives decided to share their information with security analysts. However, if the executives are conservative in terms of how much information they decide to share, this could have a negative impact on forecast accuracy. As such, a positive or negative coefficient is expected on LNEXEC. The variable $EVOL_{jt}$ represents earnings volatility. High earnings volatility should make forecasting future earnings more difficult so EVOL is included to control for inherent earnings volatility. Consistent with Minton and Schrand (1999), earnings volatility is measured as the coefficient of variation of pretax income (COMPUSTAT item #23) over the four quarters preceding the end of the quarter at which time the earnings forecast is measured. The $EVOL_{jt}$ coefficient is expected to be positively related to the forecast error. The variable $LOSS_{jt}$ is a dummy variable that equals one if $eps_{jt} < 0$ and zero otherwise. Following previous studies (e.g., Brown (2001)), which concluded that profits and losses impact forecast accuracy differently, the effect is controlled for by including LOSS in the regression. A positive coefficient on LOSS is expected implying that losses would increase forecast errors as analysts' usually have more difficulty estimating earnings when firms experience losses (Agrawal et al. (2006); Francis et al. (1996); and Hayn (1995)). In terms of the forecast bias, there could be a negative or positive coefficient on LNAN, LNEXEC, EVOL, and LOSS depending on whether security analysts are optimistic or pessimistic in their forecasts. If they are accurate, then the coefficient would be equal to zero.

Next investigated is whether the quality of the information environment has improved more for small firms since the passage of the Act. If this is the case, any improvements in the forecast accuracy of small firms would be more distinct post-SOX. The following fixed-effects regressions which test for the difference in the impact of SOX on small and large firms are estimated:

$$\begin{aligned} ANFE_{jt} = {} & b_0 + b_1\,POSTSOX_t * SMALLFIRM_j + b_2\,POSTSOX_t * LARFIRM_j \\ & + b_3\,DISP_{jt} + b_4\,LNAN_{jt} + b_5\,LNEXEC_{jt} + b_6\,EVOL_{jt} \\ & + b_7\,LOSS_{jt} + u_{jt}, \end{aligned} \tag{4a}$$

$$\begin{aligned} FB_{jt} = {} & b_0 + b_1\,POSTSOX_t * SMALLFIRM_j + b_2\,POSTSOX_t * LARFIRM_j \\ & + b_3\,DISP_{jt} + b_4\,LNAN_{jt} + b_5\,LNEXEC_{jt} + b_6\,EVOL_{jt} \\ & + b_7\,LOSS_{jt} + u_{jt}, \end{aligned} \tag{4b}$$

where $SMALLFIRM_j$ equals one if the firm is part of the S&P 600 group of firms, and zero otherwise. The variable $LARFIRM_j$ equals one if the firm is part of the S&P 500 group of firms, and zero otherwise. The other explanatory variables are as described above.

The industry effect of the Act is examined next in an attempt to explain whether there are any differences in security analysts' forecast accuracy between industries post-SOX. If the Act is achieving its objectives and is ensuring the availability of accurate financial information, the findings should indicate a more pronounced effect of SOX on forecast accuracy for firms in the industries that analysts traditionally have difficulty forecasting (e.g., technology and consumer services). The following fixed-effects regressions are estimated:

$$ANFE_{jt} = b_0 + b_1 POSTSOX_t * TCSIND_j + b_2 POSTSOX_t * OTHIND_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}, \quad (5a)$$

$$FB_{jt} = b_0 + b_1 POSTSOX_t * TCSIND_j + b_2 POSTSOX_t * OTHIND_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}, \quad (5b)$$

where $TCSIND_j$ equals one if the firm is included in the technology or consumer services sectors, and zero otherwise. The variable $OTHIND_j$ equals one if the firm is included in one of the other sectors specified in I/B/E/S, and zero otherwise. The other explanatory variables remain the same.

The final regressions examine the effect of SOX on security analyst performance and forecast bias early in the post-SOX period versus later in the post-SOX period. This provides useful information on the effect of the legislation as time goes by. The early post-SOX period is defined as the first two years (eight quarters) after the Act was implemented, and the late post-SOX period is defined as the remaining nine quarters in the sample period. The following fixed-effects regressions are estimated:

$$ANFE_{jt} = b_0 + b_1 POSTSOX_t * EARLY_j + b_2 POSTSOX_t * LATE_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}, \quad (6a)$$

$$FB_{jt} = b_0 + b_1 POSTSOX_t * EARLY_j + b_2 POSTSOX_t * LATE_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt}$$

$$+ b_7 \text{LOSS}_{jt} + u_{jt}, \quad (6b)$$

where EARLY_j equals one for the early post-SOX period, and zero otherwise. The variable LATE_j equals one for the late post-SOX period, and zero otherwise. A positive coefficient is expected if the forecast error increased in the early and late post-SOX periods, and a negative coefficient if the forecast error decreased, indicating better forecast accuracy. Looking at Equation 6(b), a coefficient of zero would indicate improved accuracy, while a positive or negative forecast would indicate optimism or pessimism in analysts' forecasts.

Table 1 summarizes the descriptive statistics. Panel A reports descriptive statistics for the resulting overall sample. On average, the ANFE is 16% and the FB is 2% while the standard deviation is 0.26 and 0.31, respectively. Actual EPS averages 0.46. Panel B shows descriptive statistics for large and small firms. The ANFE is about 21% and 14% for small and large firms, respectively. The FB is 1% for large firms and 3% for small firms. The mean number of analysts is 7.2 for small firms and 12.1 for large firms, while the mean number of company executives is 5.8 for small firms and 6.4 for large firms. Panel C of Table 1 shows the correlation matrix for the independent variables. It can be seen that the variable, POSTSOX, is significantly correlated with all of the other control variables (p-value<0.05). Thus, to the extent that POSTSOX is the most important variable, it is important to control for the other explanatory variables when examining our primary variable (POSTSOX).

2.4 Empirical Results

2.4.1 Univariate Results

Figures 1 and 2 show the graphs of the consensus forecast errors and forecast bias respectively, for the firms in the sample over the 11 year period (1996-2006). The forecast errors for the S&P 600 firms averages about 21% per year over the sample period, and are distinctly higher than the forecast errors of the S&P 500 firms, which averages about 14% (see Panel A). This is consistent with the general view that the information environment is less efficient for small firms. Also in keeping with prior research, persistent analyst optimism (represented by positive forecast bias figures) is visible for most of the forecast period, although a decrease in optimism is noted during the 2003 to 2005 period (see Panel B). This period coincides with the post-SOX period and is consistent with the view that management has become conservative in their financial reporting after the implementation of the Act.

Table 2 (Panel A) reports the pre and post-SOX consensus normalized forecast errors and forecast bias for each of the quarters. The results are mixed. For the quarters ending in March, the consensus normalized forecast errors increased post-SOX by about 20%. For the September and December quarters, the results show a decrease in the consensus normalized forecast errors post-SOX by about 6%, while the normalized forecast errors remained unchanged for quarters ending in June. However, the only statistically significant result for the difference in means is for the March quarters, which has a *p*-value of 0.02 for the *t*-test. These results hold for the overall sample, as well as for the sub-samples of large and small firms (Panels B and C). In terms of the

forecast bias, Panel A shows that there was a decrease in forecast optimism for the overall sample post-SOX, while Panel B shows evidence of forecast pessimism for the sub-sample of large firms. However, the decrease in the forecast bias for the sub-sample of small firms was not statistically significant (Panel C).

2.4.2 Multivariate Results

2.4.2.1 Security Analysts' Performance Results

Table 3 (Panel A) summarizes the results of the first fixed-effects regression as specified in equation 3a. The estimated coefficient on the POSTSOX dummy variable is positive and statistically significant, implying that there was actually a decrease in forecast accuracy following the passage of SOX. In other words, security analysts' performance has worsened post-SOX. As expected, the absolute normalized forecast errors increase with dispersion, earnings volatility, and losses indicating a reduction in forecast accuracy. The coefficient on DISP, LOSS and EVOL are all positive and statistically significant. In terms of the number of analysts, the negative and significant coefficient on LNAN indicates that as the number of security analysts increases, the absolute normalized forecast error decreases. The positive and significant coefficient on LNEXEC implies that there is a positive relationship between the number of company executives and the normalized forecast error. Therefore, it would appear that even though company executives may be knowledgeable agents who may proxy for information quality, they have become conservative post-SOX and may not readily divulge information to security analysts.

Panel B presents the results of equation 3b. The coefficient on POSTSOX is negative and statistically significant, indicating that security analysts have become pessimistic in their forecasts post-SOX. In this case, the coefficient on LNAN is positive and statistically significant, implying that the forecast bias increases as the number of analysts increases. This result is in fact consistent with other research (e.g., Beckers et al. (2004)).

2.4.2.2 Security Analysts' Performance Results by Firm Size

Table 4 reports the results from the fixed-effects regressions specified in equations 4a and 4b. For both large (S&P 500) firms and small (S&P 600) firms, Panel A shows that the normalized forecast errors increased post-SOX. The coefficients on SMALLFIRM and LARFIRM are both positive and statistically significant. Further, there is no statistically significant difference between the effect of SOX on security analysts' performance as it relates to small firms and large firms (p-value = 0.9247). This suggests that despite the far reaching nature of the Act, the information environment has actually deteriorated for both large and small firms. In terms of the forecast bias, Panel B shows that security analysts have gotten pessimistic in their earnings forecast for both large and small firms post-SOX. However, the negative coefficient on SMALLFIRM is not statistically significant so no concrete conclusions can be drawn about the forecast bias as it relates to the sub-sample of small firms post-SOX. For large firms, the coefficient is negative and statistically significant (t-statistic = 7.85), and we can therefore reasonably conclude that security analysts have become more pessimistic in their earnings forecasts post-SOX.

2.4.2.3 Security Analysts' Performance Results by Industry

Prior research has asserted that financial analysts find it difficult to forecast the earnings of firms in the technology and consumer services industries because of the large percentage of intangible assets. On that basis, the industry effect of SOX is examined. Table 5 shows the results of the fixed-effect regressions specified in equations 5a and 5b. The normalized forecast errors shown in Panel A have increased post-SOX for all industries in the sample. The coefficients on both TCSIND and OTHIND are positive and statistically significant; however, there is no difference between the two groups post-SOX (p-value = 0.2527). In terms of the forecast bias, Panel B indicates that security analysts have become pessimistic in their forecasts post-SOX as is evident by the negative coefficient on TCSIND and OTHIND. However, there is less pessimism in the technology and consumer services sectors (p-value = 0.0113).

2.4.2.4 Security Analysts' Performance Results by Time Periods

Lastly, the effect of SOX on analysts' performance as more time passes is investigated. One would expect that as the years go by and firms adapt fully to the regulations of SOX, the quality of information available would increase. In essence, if SOX is achieving its objectives, the information environment should become more efficient and reliable. Table 6 reports the results from the fixed-effects regressions specified in equations 6a and 6b. The findings in Panel A indicate that there is an increase in normalized forecast errors during both the early and late post-SOX periods, but the increase is slightly higher in the early post-SOX period. However, there is no

significant difference between the early and late periods (p-value = 0.5552). Security analysts have also become more pessimistic in their earnings forecasts in both the early and late post-SOX periods. Panel B shows that the coefficients on EARLY and LATE are negative and statistically significant.

One concern about the above results is that Reg FD could have impacted the findings. Reg FD was effective from October 2000, and SOX was effective from July 2002. Therefore, most of the pre-SOX sample is also in the post-Reg FD period, and the entire post-SOX sample is also in the post-Reg FD period. In order to control for any influence that Reg FD may have on the results, the pre-SOX period was deemed to be from the first quarter of 2001 to the third quarter of 2002. This time period represents the post-Reg FD period as well as the pre-SOX period, and minimizes contamination from Reg FD. The results are unaffected when the regressions were estimated using this new time period.

2.5 Conclusions and Implications

This essay empirically investigates the impact of SOX on security analysts' performance. Specifically, it assesses whether forecast accuracy has improved after the passage of the various components of the Act because of the increased quality and transparency of financial operations, corporate disclosure, and corporate governance that the legislation aims to achieve. Also, it examines the differences in changes in analysts' forecast accuracy between small and large firms, and between firms in certain industries. To gain additional insight, the essay goes a step further and

investigates security analysts' performance during the early and late post-SOX periods to determine whether any differences exist.

The tests show that consensus earnings forecasts become less accurate after SOX was implemented. The tests also find that security analysts become more pessimistic in their forecasts post-SOX. Further, there is no significant difference in the decrease in forecast accuracy for smaller firms. Notably, the reduction in forecast accuracy for small firms is very similar to the reduction in forecast accuracy for large firms. However, there is a statistically significant difference in the forecast bias between large and small firms, with security analysts being much more pessimistic in the earnings forecasts for large firms. Findings also suggest that there is a larger decrease in forecast accuracy in the technology and consumer services industries than in other industries. Moreover, security analysts are less pessimistic in their earnings forecasts for the firms in the technology and consumer services industries when compared to the other industries. In terms of the early and late post-SOX periods, the results indicate that forecast accuracy decreased by about the same amount over both periods. Also, the forecast bias shows that analysts are equally pessimistic in their earnings forecasts during both time periods post-SOX.

The findings allow several conclusions. First, the flow of information to security analysts, and the financial markets as a whole, has worsened. This leads one to believe that CEOs, managers, and other corporate insiders have become more conservative in their reporting because of the penalties associated with noncompliance with the Act. Indeed, Lobo et al. (2006) find an increase in conservatism in financial

reporting post-SOX and the results of this study support that finding. Second, this conservatism has also affected security analysts' performance as it relates to both small and large firms, as well as firms across industries. Therefore, the difficulty inherent in forecasting the earnings of small firms and firms in certain industries (e.g., the technology and consumer services sectors) still exists. Third, security analysts are reacting to the more conservative nature of corporate insiders by erring on the side of caution and becoming more pessimistic in their earnings forecasts. It has been documented that security analysts are judged less harshly when they are pessimistic in their forecasts as opposed to when they are optimistic in their forecasts, especially when the earnings forecasts are for large and more well-known firms. Fourth, Reg FD was adopted less than two years prior to SOX. Essentially, Reg FD changed the way security analysts had conducted business for decades so more time may be needed to adequately assess the impact of SOX on the performance of security analysts as they adjust to the new legislation.

This essay provides early information on the impact of SOX on security analysts' performance. The results are timely especially since the SEC, politicians, market participants, and other interested parties, must periodically assess the effect of SOX, and other regulations, on public companies and the financial information environment as a whole.

CHAPTER 3

SECURITY ANALYSTS' MONITORING ACTIVITY AND FIRM VALUE

3.1 Introduction

Financial markets thrive on good information. The more accurate the information, the more efficiently these markets will function. Academicians and practitioners agree that security analysts play a very important role as information intermediaries in the financial markets. They collect and analyze information obtained from corporate managers, and present it in a form that is easy to understand. In turn, both individual and institutional investors, brokers, and other market participants use that information in making investment decisions. Thus, there is general consensus that these security analysts make a key contribution in ensuring the informational efficiency of the financial markets by increasing the information set of investors.

The monitoring role played by security analysts is an essential one. Jensen and Meckling (1976) postulate that security analysts' role as monitoring agents is significant, especially when agency problems exist. It has been shown that monitoring activity can curtail managers' ability to obtain both non-pecuniary and pecuniary benefits from shareholders. Moreover, bondholders find monitoring activity by security analysts effective in helping to prevent risk shifting from shareholders to bondholders.

In essence, the authors highlight the monitoring activities of security analysts as a means of reducing agency costs in public firms created by the separation of ownership and control.

Another potential impact of security analysts' monitoring activities is the positive effect on corporate value. Indeed, Jensen and Meckling (1976) surmise that one of the primary advantages of security analysts' monitoring activities is the higher firm value that shareholders enjoy. Moreover, Chung and Jo (1996) find that security analysts' monitoring functions lead to a "significant and positive impact on firms' market value." Given that security analysts play a key role in broadening the information set of investors and other market players, as well as reducing agency costs, it can be posited that there is a positive relationship between the level of security analysts' monitoring activity and firm value.

SOX was implemented after a series of high-profile corporate scandals, which included bankruptcies, inadequate accounting practices, and inefficient audit firms that chose to ignore these practices. At the core of SOX is the improvement in the quality of financial reporting and corporate governance and, by extension, the restoration of investors' confidence in the financial markets. SOX forces public companies to be more vigilant and transparent in their business activities, particularly in their financial reporting. To this end, SOX mandates a number of rules and regulations: (1) chief executive officers and chief financial officers of all public firms must certify the accuracy of the financial statements; (2) audit committees must be independent; (3) there must be established procedures in place to assess the firm's internal controls; and

(4) there must be increased oversight of audit firms. Therefore, corporate managers/insiders are held to extremely high standards, and the fines and penalties for noncompliance with the requirements of SOX are severe.

Over five years have passed since the Act was implemented, and it is still unclear whether SOX is achieving its objectives. Specifically, its ultimate impact on the U.S. financial markets is still being debated. The following question is addressed. What effect has the legislation had on security analysts' monitoring activity, agency costs, and firm value? If the Act is indeed meeting the objectives as set out in the rules and regulations, then there should be a positive impact on overall monitoring activities and, by extension, agency costs and firm value. If, on the other hand, the rules and regulations are more superficial than substantial, then there should not be any real effect on overall monitoring activities, agency costs, and firm value. In addition, the impact on large firms may be different from the impact on small firms since prior research has concluded that small firms are subjected to disproportionately higher SOX-related compliance costs than large firms (Kamar et al. (2007)).

This essay is related to the evolving literature in finance that investigates the impact of government legislation on the financial markets. To the extent that the legislation aims to improve the U. S. corporate governance landscape and information environment, the focus of this essay is on changes in monitoring activity (which would impact agency costs) and firm value for both large and small firms post-SOX. More specifically, the essay examines the effect of SOX on security analysts' monitoring activity and firm value. An empirical comparison is made of analysts' monitoring

activity and firm value pre- and post-SOX. Moreover, the essay examines whether there is a difference in post-SOX analysts' monitoring activity and firm value between large and small firms. The relationship among firm valuation, analyst following, and corporate governance has been well documented in previous studies. For example, Lang et al. (2004) find that security analysts are less likely to follow firms that have the potential to manipulate information. Further, they find that corporate governance is a primary indicator of security analysts' willingness to follow firms, and that increased analyst following is directly related to higher firm valuations.

On the other hand, Jensen and Meckling (1976) point out that monitoring also takes place directly through the restrictive covenants that are inherent in bonds. This type of monitoring may not be perfectly equivalent to security analyst monitoring activity, but may act as a substitute for security analyst monitoring. As such, researchers have documented a negative relationship between the debt ratio and security analyst monitoring activity. Using this theory, the components of SOX can be deemed restrictive covenants on public companies, and the traditional positive relationship between analyst following and firm value may indeed break down post-SOX. Even though there may be an increase in firm value post-SOX, the level of analyst monitoring may actually decrease because of that substitutional monitoring role provided by the components of the Act.

On that basis, and given that the main aim of SOX is to improve corporate governance and the accuracy of financial reporting, the effect of SOX on analysts' monitoring activity and firm value is pertinent to the body of work and justifies this

empirical analysis. Also, the essay provides important feedback to investors, corporate managers/insiders, as well as policy makers on the effectiveness of the Act.

Three hypotheses are investigated. The first hypothesis is that security analysts' monitoring activity (proxied by the number of analysts that cover a firm) has decreased post-SOX. Lang et al. (2003) conjecture that good corporate governance plays a significant role in whether security analysts follow particular firms. However, if the legislation itself is acting as a monitoring mechanism, in much the same way that bond covenants do, the level of analyst monitoring activity could actually decrease post-SOX.

The second hypothesis is that firm value (proxied by Tobin's q) has increased post-SOX. Previous research has concluded that there is a positive and significant relationship between security analysts' monitoring activity and firm value (Chung and Jo (1996)). The research has also concluded that a higher level of monitoring activity, whether it is provided directly by analysts or indirectly by restrictive covenants (or legislation), leads to higher firm value. Therefore, if overall monitoring activity has increased post-SOX, it is reasonable to expect that firm value has likewise increased.

The third hypothesis examines security analysts monitoring activity and firm value within the context of firm size. It is hypothesized that the effect of SOX on security analysts' monitoring activity and firm value for small firms will be different from the effect on large firms. Kamar et al. (2007) in examining SOX's effect on small firms conjecture that both the compliance costs of SOX, as well as the potential benefits, can be greater for small firms than for large firms. In addition, prior research suggests that small firms are more prone to having ineffective internal control systems

than large firms (Doyle et al. (2007)). As a result, these small firms are faced with higher compliance costs associated with increased audit fees directly related to bringing their internal control systems in line with the mandates of SOX. On that basis, it is expected that there will be a difference in security analysts' monitoring activity and firm value between large and small firms post-SOX.

3.1.1 Organization

Section 3.2 reviews relevant previous research and presents this essay's contribution to the literature. Section 3.3 describes the data and methodology. Section 3.4 presents the empirical results as well as related findings, and Section 3.5 presents the conclusions and implications.

3.2 Literature Review

3.2.1 Security Analysts' Monitoring Activity

For many decades now, financial market participants have acknowledged the important role security analysts play in the overall operations of the financial markets. Chang et al. (2006) point out that security analysts offer market participants two primary services. First, they collect and analyze a large amount of information from corporate insiders and present it to potential investors and other market participants in a simpler way. Second, security analysts disseminate information that may not otherwise be known by market participants. Related empirical research (e.g., Givoly and Lakonishok (1984), Moyer et al. (1985), and Brown and Rozeff (1978)) have all pointed out that security analysts' earnings forecasts affect stock prices and are more reliable

than univariate time-series models or other naïve forecasts. Moreover, the informational content of earnings forecasts and its use by investors have been highlighted in several early studies (e.g., Givoly and Lakonishok (1979), Elton and Gruber (1981), Dempsey (1989), and Abarbanell (1991)).

Supporting the informational role of security analysts, Chang et al. (2006) conjecture that the amount of analyst coverage is negatively correlated with the information asymmetry a firm is exposed to because security analysts directly reduce information asymmetry, or because security analysts are drawn to more transparent firms. Indeed, Lang et al. (2004) find that security analysts are more likely to follow more transparent firms. Hong et al. (2000) examine analyst coverage and the profitability of momentum strategies. They conclude that firms with higher analyst coverage are more informative and that the profitability of momentum strategies is lower. In looking at information intermediaries and the pricing of accruals, Barth and Hutton (2000) find that stock prices of firms covered by more security analysts assimilate information on cash flows and accruals more quickly than stock prices of firms covered by fewer security analysts. Bowen et al. (2004) investigate analyst coverage and the cost of raising equity. The authors find that with seasoned equity offerings, firms that are being followed by a high number of security analysts are faced with significantly less underpricing because security analysts work to reduce information asymmetry. Barth et al. (2001) examine the link between security analysts' incentives to cover firms and the extent of their intangible assets. They conjecture that

the greater the analyst coverage, the lower the mispricing, information asymmetry and uncertainty about firm value.

3.2.2 Security Analysts' Monitoring Activity and Firm Value

What is the relationship between security analyst monitoring activity and firm value? Jensen and Meckling (1976) suggest that security analyst monitoring activity is especially important in firms characterized by a high level of agency problems. The monitoring function performed by security analysts can be used as a means of reducing the perquisite consumption enjoyed by managers, which in turn reduces the agency costs. Therefore, the authors conclude that the benefits of security analyst monitoring activity should be reflected in a higher corporate value. Myers and Majluf (1984) look at corporate financing and investment decisions when firms have information which investors do not have. They find that firms which are characterized by greater information asymmetry are more apt to endure misvaluation. Thus, the role that security analyst monitoring activity plays in proper valuation is further emphasized. Moyer et al. (1989) examine security analyst monitoring activity, agency costs and information demands, and conjecture that security analyst monitoring activity is positively related to the number of shareholders and the outstanding share value. They suggest that the higher the market value of outstanding equity, the more beneficial is the security analyst monitoring activity. Chung and Jo (1996) investigate the impact of security analysts' monitoring and market functions on the market value of firms. The authors surmise that security analyst monitoring activity helps motivate managers, which in turn helps to mitigate the agency costs associated with the separation of

ownership and control. They also postulate that security analysts increase the amount of information available to investors. On this basis, the authors further conclude that security analyst monitoring activity has a positive impact on firm value.

3.2.3 Corporate Governance and Firm Value

Shleifer and Vishny (1997) define corporate governance as the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment. According to them, it is a means by which shareholders ensure that managers do not expropriate the capital they supply, or invest it in unprofitable projects. Lang et al. (2004) define corporate governance mechanisms as the means by which managers are persuaded to act in the best interest of outside investors. The authors distinguish between country-specific mechanisms (shareholder protection, legislation, and the market for corporate control) and firm-specific internal mechanisms (ownership structure, managerial incentive provisions, and auditor choice). Shleifer and Vishny (1997) acknowledge that most developed economies have a good handle on the problem of corporate governance, which means that outside investors are assured of receiving profits on the financing which they provide. However, they concede that there are still problems and corporate governance mechanisms can be improved. Indeed, the high-profile governance failures that emerged at corporations such as Enron, Tyco and WorldCom, and the subsequent enactment of SOX, represent proof that the corporate governance mechanisms even in developed market economies are not perfect and need to be improved.

Security analysts must be key players in any corporate governance system because they act as the primary information intermediaries between firms and the capital market. The empirical literature supports the relationship between corporate governance and security analyst monitoring activity. Fama and Jensen (1985) surmise that the control of agency problems is important for the viability of corporations, and security analysts' role as outside monitoring agents help in mitigating agency costs. Healy and Palepu (2003) conjecture that a well-functioning capital market is based upon efficient linkages of information, incentives, and governance between managers and investors – a process that is facilitated by a system of intermediaries such as security analysts, debt rating agencies, financial institutions, external auditors and internal governance boards. Lang et al. (2004) describe the relationship between analysts and corporate governance as a natural one because of the role security analysts play as monitors of management's behavior, and as informational intermediaries between corporate insiders and market participants. Chhaochharia and Grinstein (2007) acknowledge that optimal corporate governance structure relies on a firm's monitoring needs, as well as the costs and benefits of various monitoring mechanisms. However, they argue that because these costs and benefits differ across firms, optimal governance structure cannot be the same for all firms and enforcing one corporate governance structure on all firms might be suboptimal for some firms.

In terms of the relationship between corporate governance structures and firm value, Yermack (1996) finds a negative association between small boards of directors and firm value suggesting that small boards are more effective. Gompers et al. (2003)

examine corporate governance and equity prices. The authors find a positive relationship between insiders' cash flow rights and firm value, and a negative relationship between voting rights and firm value. Bebchuk and Cohen (2005) investigate the costs of entrenched boards and find that firms with highly entrenched boards of directors are associated with reduction in firm value, as measured by Tobin's *q*. More closely related to this research, the following studies look at the impact of SOX on firm value. Zhang (2005) finds a negative impact of SOX on firm value, while Jain and Rezaee (2006) and Li et al. (2006) find a positive effect of SOX on firm value. Chhaochharia and Grinstein (2007) in examining the announcement effect of the rules associated with SOX, find that firms that are less compliant with the rules earn positive abnormal returns compared to firms that are more compliant.

3.2.4 Firm Size

The role that security analysts play in reducing information asymmetry has been well documented in the empirical literature. How does that role differ when small firms are examined? Small firms are usually characterized by a high level of information asymmetry, and researchers attribute that to the poor information environment relative to that of larger firms (Grant (1980), Collins et al. (1987), and Bhushan (1989)). Previous research also finds that there is an inverse relationship between firm size and the amount of unexpected information communicated to the market by actual earnings reports (Atiase (1985)). Indeed, Myers and Maluf (1984) conclude that these small firms are more likely to suffer from unfavorable misvaluation because of their poor information environment, which translates into high information asymmetry. Relatedly,

Chang et al. (2006) point out that security analysts are attracted to more transparent firms and firms that are easier to follow. Likewise, Lang et al. (2004) conjecture that there will be less analyst following in firms with serious corporate governance issues. The authors also find a positive association between security analysts monitoring activity and firm value.

The effect of SOX on small firms is of particular importance in this study as many researchers have highlighted the point that the legislation may be too burdensome for small firms and therefore, the effect on their corporate value warrants special analysis. Kamar et al. (2007) conjecture that small firms may be faced with relatively higher compliance costs than large firms due to a significant increase in audit fees. Moreover, Holmstrom and Kaplan (2003) argue that relative to their size, small firms find it more costly to comply with the internal control requirements specified by SOX. Recent research investigating the Act's impact on both large and small firms finds that large firms that are less compliant with SOX earn positive abnormal returns, while small firms that are less compliant earn negative abnormal returns (Chhaochharia and Grinstein (2007)). On that basis, the authors suggest that some provisions of SOX are harmful to small firms.

3.2.5 Contributions to the Literature

This essay complements and adds to the existing literature by focusing on the U.S. corporate governance landscape after the implementation of SOX, and how the new rules have affected security analysts' monitoring activity and corporate value. Moreover, the essay adds a new branch to the corporate governance and regulation

literature. Most prior research looks at the announcement effect of SOX on firm value (Zhang (2005), Li et al. (2006), and Jain and Rezaee (2006)). In this essay, however, the focus is on an empirical comparison of security analyst monitoring activity and firm value pre- and post-SOX. Put differently, the attention here is on changes in security analyst monitoring activity and firm value after the enactment of SOX. This research is important because it sheds some new light on whether the legislation is actually improving the corporate governance landscape and by extension, increasing firm value. In addition, it provides some unique findings about the traditional positive relationship between security analysts' monitoring activity and firm value. Consistent with previous research, the study also takes into account the possible endogenous relationship between security analyst monitoring activity and firm value and estimates that relationship simultaneously.

3.3 Data and Methodology

3.3.1 Description of Data and Sample Selection

The data for this study come from CRSP, I/B/E/S and COMPUSTAT. Specifically, stock price data are obtained from CRSP, earnings forecast data are obtained from I/B/E/S, and company financial data are obtained from COMPUSTAT. The time period under review is from January 1996 to December 2006. Since the Act was implemented on July 25, 2002, the pre-SOX period was deemed to be 1996-2002, while the post-SOX period includes the years 2003 to 2006. This time horizon is chosen in order to minimize the sensitivity of the results to other macroeconomic

shocks in the economy. The firms used in the study come from the S&P 500 Index and the S&P Small Cap 600 Index, and include only those firms that have a December fiscal year end.

Following Moyer et al. (1989) and Chung and Jo (1996), the number of earnings forecasts made by the security analysts of a particular firm's stock is used as the proxy for the level of security analyst monitoring activity. For each firm, the number of security analysts making one-year earnings forecasts was obtained. Firms being followed by a single security analyst were dropped from the sample since it would be impossible to calculate the dispersion of the analysts' forecasts, which is also an important variable in the model. This earnings forecast data was obtained from I/B/E/S along with the actual earnings per share (EPS) data. Consistent with McConnell and Servaes (1990) and Lang and Stulz (1994), Tobin's q is used as the proxy for firm value. It is measured as follows: Tobin's q = (market value of equity + assets – book value of equity) / assets. Data obtained from COMPUSTAT were used to compute Tobin's q, the debt ratio, advertising ratio, R&D ratio, return to capital, and an alternative measure of firm size based on the book value of assets. Stock price and return variance data were obtained from CRSP. Firms with missing data from these three databases were dropped from the sample.

The final sample consists of 4,642 observations, representing 422 firms. Of these firms, 230 are from the S&P 500 Index and 192 are from the S&P Small Cap Index. Approximately 37 percent of the observations are during the post-SOX period, and 46 percent of the observations represent small firms.

3.3.2 Methodology

Chung and Jo (1996) highlight the endogenous nature of security analyst following in their analysis of the impact of analyst monitoring activity on firm value. The authors note that increased analyst following causes an increase in firm value (Tobin's *q*); however, they also conjecture that firm value could in turn impact the number of analysts following a firm as more analysts may be motivated to follow high-value firms. Against this background, the following simultaneous equation system is used to empirically represent the association among firm value (*q*), security analyst monitoring activity (NAN), and a number of control variables post-SOX. The model defined in equations 1 and 2 represents a case of simultaneity, which occurs when there is a feedback association between one or more of the independent variables and the dependent variable.[16] Simultaneity causes the OLS-estimated coefficients and standard errors to be biased. Therefore, to eliminate the simultaneity and consistent with Chung and Jo (1996), a three stage least squares (3SLS) regression is used to estimate the fixed effects panel data model presented below.[17]

$$\ln(\text{NAN}_{it}) = a_0 + a_1 \ln(q_{it}) + a_2(\text{Debt Ratio}_{it}) + a_3(\text{Advert Ratio}_{it}) + a_4(\text{R\&D Ratio}_{it}) + a_5(1/\text{Price}_{it}) + a_6 \ln(\text{Trading Volume}_{it}) + a_7 \ln(\text{Return Variance}_{it}) + a_8 \ln(\text{Firm Size}_{it}) + a_9(\text{SOX}_t) + u_{it} \quad (1)$$

[16] See Pindyck and Rubenfeld (1997) for a thorough discussion on simultaneous equations and endogeneity.

[17] Schaffer, M.E., 2007. xtivreg2: Stata module to perform extended IV/2SLS, GMM and AC/HAC, LIML and k-class regression for panel data models. http://ideas.repec.org/c/boc/bocode/s456501.html.

$$\ln (q_{it}) = b_0 + b_1 \ln (\text{NAN}_{it}) + b_2 (\text{Debt Ratio}_{it}) + b_3 (\text{Advert Ratio}_{it}) + b_4 (\text{R\&D Ratio}_{it}) + b_5 \ln (\text{Dispersion}_{it}) + b_6 \ln (\text{Shareholders}_{it}) + b_7 (\text{Return to Capital}_{it}) + b_8 \ln (\text{Firm Size}_{it}) + b_9 (\text{SOX}_t) + u_{it} \quad (2)$$

The debt ratio (Debt Ratio$_{it}$) is equal to the long-term debt divided by the total common equity at year end. Moyer et al. (1989) postulate that the higher the level of debt in a firm's capital structure, the more covenants that will be available to restrict a firm's functions. In essence, the covenants act as a monitoring mechanism, and there is a reduced need for security analyst monitoring activity. Therefore, a negative relationship between the debt ratio and security analyst monitoring activity is expected. The relationship between firm value and the debt ratio is a little more complicated.[18] If a firm is enjoying its optimal capital structure and the probability of financial distress is nonexistent, the tax benefits of debt will outweigh any costs and there will be a positive relationship between the debt ratio and firm value. On the other hand, if a firm has too much debt in its capital structure, then the risk of financial distress and bankruptcy increases leading to a decrease in firm value.

The advertising ratio (Advert Ratio$_{it}$) is equal to the annual advertising expenditure divided by annual sales. The R&D ratio (R&D Ratio$_{it}$) is equal to annual R&D expenditure divided by annual sales. These two control variables are likely to exert a positive influence on security analyst following as analysts would be more familiar with highly advertised firms. Likewise, firms with a high level of R&D expenditure would be followed by more security analysts because these firms are

usually superior in terms of quality. Indeed, Chung and Jo (1996) find a positive and significant relationship between analyst following and these two variables. In terms of firm value, previous research (e.g., Hall (1993) and McConnell and Servaes (1990)) finds a positive association between advertising and R&D expenditure and firm value.

The yearly trading volume (Trading Volume$_{it}$) of each firm is calculated as the mean of the monthly dollar trading volume during each year. The return variance (Return Variance$_{it}$) is measured using the monthly stock returns of each firm during the year. The share price (1/Price$_{it}$) for each firm is calculated using the midpoints of the bid and ask prices for each month, and then finding the average over the year. For a better model specification, and following Brennan and Hughes (1991), the reciprocal of the yearly share price is used. Consistent with Chung and Jo (1996), the book value of total assets is used as a proxy for firm size (Firm Size$_{it}$). Prior studies (e.g., Moyer et al. (1989), Bhushan (1989), and O'Brien and Bhushan (1990)) have found a positive relationship between security analyst monitoring activity and trading volume, return variance and firm size, and a negative relationship with share price. However, a negative association is found between firm value and firm size.

The dispersion (Dispersion$_{it}$) of security analysts' forecasts for each firm is equal to the coefficient of variation of the security analysts' forecasts for each year, and is a measure of risk. The return to capital (Return to Capital$_{it}$) for each firm is equal to net operating income divided by (total assets minus cash and investments). The number of shareholders (Shareholders$_{it}$) acts as a proxy for the investor base. In terms of firm

[18] See Modigliani and Miller (1958) for their seminal research on capital structure and firm value.

value, previous research (e.g., McConnell and Servaes (1990)) has reported a negative relationship for dispersion and firm size, while a positive relationship is reported for return to capital and the number of shareholders. The variable SOX_t is a dummy variable that equals one for the post-SOX period, and zero otherwise.

Table 7 summarizes the descriptive statistics separately for the overall sample and for the four size groups. Panel A reports descriptive statistics for the overall sample, while Panels B and C report descriptive statistics for the size groups. For each variable, the mean, median and standard deviation (SD) are reported. Panel A shows that the average firm value (Tobin's *q*) for the entire sample is 2.10 and the average number of analysts is 12.24. The mean debt ratio is 0.82 and the mean number of shareholders is approximately 46,000. Panels B and C show that for the smallest firm size quartile (Q1), the mean number of security analysts following a firm is 5.34, while for the largest firm size quartile (Q4), the mean number of security analysts is 19.36. In terms of firm value, the smallest firms exhibited the highest mean Tobin's *q* (2.29), while the largest firms had a mean Tobin's *q* of 1.99. This result is consistent with Chung and Jo (1996) who found that smallest firms have higher *q* ratios. In terms of the debt ratio, as expected, the smallest firms have the lowest mean debt ratio (0.44) compared to the mean debt ratio of the largest firms (1.27).

3.4 Empirical Results

This section reports the results on the effect of SOX on security analysts monitoring activity and firm value as defined in the structural model (equations 1 and

2). First, the impact of the legislation on analyst monitoring activity (or analyst following) is examined. Then, given the documented positive relationship between analyst following and firm value (Tobin's q), the impact of the legislation on firm value is examined to determine whether that relationship has changed post-SOX. Finally, the effect on various firms (grouped by size) is investigated.

3.4.1 Security Analysts' Monitoring Activity Results

Panel A of Table 8 presents the results on the impact of SOX on security analysts' monitoring activity. It is hypothesized that security analysts' monitoring activity has changed post-SOX. The tests are motivated by two main ideas: (1) Security analysts tend to follow firms that have high corporate value, better corporate governance systems, and are more transparent in their financial reporting and other corporate disclosure; and (2) the more covenants that govern/restrict a firm's activities, the lower would be the demand for security analysts monitoring activity, *ceteris paribus*, because the covenants would essentially be acting as a monitoring mechanism.

As expected, Panel A shows a positive and statistically significant relationship between security analyst monitoring activity and firm value. Specifically, for every one percent increase in the firm value, the results show that analyst monitoring activity (analyst following) increases by 0.5213 percent. However, the results further suggest that security analyst monitoring has decreased post-SOX providing empirical support for the conjecture that the legislation acts similar to a bond covenant restricting public firms' activities, thereby diminishing the need for security analyst monitoring. The coefficient on SOX is negative and highly significant (*t-statistic* = -8.51).

Consistent with previous research (Moyer et al. (1989)), the results show a negative and significant association between the debt ratio and analyst following. Also, the results indicate security analyst monitoring activity is positively and significantly associated with the R&D ratio, trading volume, and firm size. However, no statistical significance was found between analyst monitoring activity and the advertising ratio, share price and the variance of returns.

3.4.2 Firm Value Results

Panel B of Table 8 presents the results on the effect of SOX on firm value. It is hypothesized that firm value has increased post-SOX. Consistent with this study's earlier findings, the results indicate a positive and significant relationship between firm value and analyst following (*t-statistic* = 5.01). However, the results show that firm value has increased post-SOX (*t-statistic* = 4.49) despite the earlier finding of a decrease in analyst following post-SOX. This corroborates the conjecture that the legislation is indeed playing a monitoring role. There is no vacuum created by the decrease in security analyst monitoring activity because of the monitoring mechanism called SOX. Therefore, it is no surprise that this study finds an increase in the firm value alongside a decrease in analyst following post-SOX.

The results also indicate a positive and significant association between firm value and the debt ratio, the R&D ratio, and the number of shareholders (i.e., the investor base). Consistent with previous research, the results show a negative and significant relationship between firm value and firm size, as well as the dispersion of

analysts' forecasts. No significant association was reported between firm value and the advertising ratio or the return to capital.

3.4.3 Firm Size Results

Table 9 presents the results on the impact of SOX on security analyst monitoring activity and firm value by firm size. The hypothesis is that the impact of SOX on security analysts' monitoring activity and firm value post-SOX for small firms will be different from the impact on large firms. Panel A shows the results for quartile 1, which represents the smallest firms based on the book value of assets. A positive and significant two-way relationship is reported between firm value and security analyst following. Moreover, the results show an increase in firm value (*t-statistic* = 2.83) and a decrease in analyst following (*t-statistic* = -3.05) post-SOX. Again, the results lend empirical support to the hypothesis that the legislation plays a monitoring role, which lessens the need for security analyst monitoring activity even among the smallest group of firms. In this quartile, the findings also show that analyst following is positively and significantly associated with only firm size and trading volume. In terms of firm value, there is a positive and significant relationship with return to capital, but a negative and significant relationship with dispersion and firm size. No significance was reported with any of the other variables.

Panel B presents the results for quartile 2. The results are consistent with the previous findings in this study. Security analyst following and firm value are positively and significantly associated. However, the increase in firm value post-SOX occurs in tandem with a decrease in security analyst following, reflecting the findings of the firms

in quartile 1. In terms of the other variables, security analyst following is positively and significantly associated with the share price, return variance, trading volume, and firm size, and firm value is negatively associated with firm size.

The results for quartile 3 are presented in Panel C and are in agreement with the other findings. A two-way positive and significant relationship is reported between firm value and security analyst following. As expected, a decrease in security analyst following is reported, alongside an increase in firm value post-SOX. It should be noted here that in this quartile representing the larger firms, the increase in firm value (0.03 percent) is less than the increase in firm value in quartiles 1 and 2 (0.13 percent and 0.22 percent, respectively). This suggests that SOX has indeed been more beneficial to smaller firms. The results also show a negative and significant association between analyst following and the debt ratio, and a positive and significant association between analyst following and the advertising ratio, R&D ratio, trading volume and firm size. In terms of the firm value, findings indicate a positive and significant relationship with the advertising ratio, return to capital, and firm size.

Quartile 4 represents the largest firms, and the findings are similar to what has been presented. A decrease in security analyst monitoring activity is recorded post-SOX. However, the increase in firm value post-SOX is 0.05 percent, which is much less than the increase in firm value for the smaller firms in quartiles 1and 2. This finding provides empirical support to the postulation put forth by Kamar et al. (2007) highlighting the potential benefits to small firms as a result of implementing the various components of SOX. The authors suggest that as a result of the legislation, small firms

(usually characterized by poor internal control systems) will become more efficient because of increased accountability, stricter internal control systems and financial reporting. In terms of the other variables, the findings for this group of firms indicate a positive and significant relationship between firm value and the advertising ratio as well as the return to capital. A negative and significant relationship is reported between firm value and the dispersion of analysts' forecasts. Security analyst following is negatively associated with the debt ratio, but positively and significantly associated with the advertising ratio, the R&D ratio, and the trading volume.

3.5 Conclusions and Implications

This essay investigates the effect of SOX on security analyst monitoring activity and firm value, seeking evidence on whether analyst following has changed post-SOX and the effect (if any) on the traditional positive two-way relationship between security analyst following and firm value (Tobin's q). A simultaneous equation system is employed to conduct the tests using the 3SLS method.

The evidence presented supports the view that security analyst monitoring activity has changed post-SOX. In fact, findings indicate that there has been a decrease in security analyst following after the Act was implemented, even though an increase in firm value was recorded during the same time period. This suggests that the traditional positive bidirectional association between analyst following and firm value has changed because of the monitoring role that SOX plays in the financial markets. In much the same way that bond covenants reduce the need for security analysts monitoring activity,

the legislation (SOX) can be deemed a covenant, or a monitoring mechanism, governing all internal aspects of public firms, likewise reducing the need for security analyst monitoring. In essence, whereas a bond covenant restricts an issuer's activities and aims to maintain financial prudence, SOX's emphasis is on accurate financial disclosure and minimizing fraudulent behavior. Therefore, SOX motivates managers and their firms to be efficient leading to a decrease in agency costs and in turn, a decrease in security analysts monitoring activity.

The findings in this essay also support the view that SOX has had a positive impact on firm value. Critics of the legislation have always highlighted the high costs of compliance and the burdensome nature of the Act itself as obstacles to any potential benefits. They are of the view that SOX would hinder innovation, risk taking and productivity stunting economic growth in the process. However, this essay's findings support the position that the benefits of higher corporate value outweigh any potential costs that are inherent in the Act. In every firm size group, the empirical results indicate an increase in firm value post-SOX.

The potential effect of SOX on small firms has been somewhat difficult for academicians and practitioners alike to analyze. On one hand, some believe that the compliance costs of SOX would be too great for these small firms to realize any benefits. Conversely, others believe that SOX will go a long way in making these small firms more efficient. The results of this essay support the view that SOX has had a positive impact on small firms. The increase in firm value for small firms has increased by a larger percentage than the increase for the group of larger firms. This gives

credence to the view that smaller firms may actually benefit more from SOX than larger firms because of the increased transparency that these small firms enjoy post-SOX.

Overall, this body of research is consistent with the view that monitoring activity, whether it is by security analysts, financial institutions, bond covenants, or legislation such as SOX, plays a key role in reducing agency costs and increasing corporate value.

CHAPTER 4

COST OF EQUITY CAPITAL

4.1 Introduction

In this essay, the impact of the adoption of SOX on the cost of equity capital is empirically investigated. This must be of particular interest and importance to corporate insiders, investors, and indeed all market players as the cost of equity capital represents the compensation the market demands for owning a stock and assuming the risk of ownership. It is essential to establishing the hurdle rate for a firm's investment projects, which in turn affects the firm's profitability. Also, management uses the cost of equity capital in trying to determine a firm's optimal capital structure, which remains one of the primary determinants of the health and success of any firm.

Easley and O'Hara (2004) show that the quality of information as well as a firm's information structure has an effect on its cost of capital. The authors report that investors require a higher return to acquire stocks of firms with more private information. This means that the better the information environment, the lower the information asymmetry, and the lower the return demanded by investors because stocks will be viewed as being less risky. Therefore, to the extent that the emphasis of SOX is on improved corporate governance systems, transparency, and information quality

(including the accurate dissemination of information), the effect of the Act on the cost of equity capital is pertinent and warrants further investigation.

Merton (1987) puts forth the investor recognition hypothesis. In essence, this hypothesis states that firms which receive minimal publicity and are not covered by many security analysts have a higher cost of capital. According to Merton's hypothesis, it is expected that large firms would have a lower cost of equity capital because these firms are usually well known and garner more media attention. On the other hand, because small firms are less publicized and are usually characterized by high levels of information asymmetry, it is expected that these firms would be subjected to a higher cost of equity capital. Therefore, the impact of SOX on the cost of equity capital of small firms must also be an important consideration, especially if the benefits of SOX to the financial markets are to be adequately assessed.

The role of corporate disclosure and its relationship to the information environment and subsequently, the cost of equity capital have previously been examined. Prior research has documented the negative association between the cost of equity capital and the corporate disclosure level (Botosan (1997); Leuz and Verrecchia (2000); Botosan and Plumlee (2002)). Diamond and Verrecchia (1991) conjecture that wider bid-ask spreads are associated with a higher cost of equity capital because investors expect to be compensated for increased transaction costs. However, the disclosure of information by firms helps in mitigating the information asymmetry component in the bid-ask spreads thereby lowering the cost of equity capital. As a result, investors are more inclined to take greater positions in a firm's stock, which

translates into increased demand, higher stock prices, and as a result, a lower cost of equity capital.

Leuz and Verrecchia (2000) in exploring the economic consequences of increased corporate disclosure surmised that a firm's commitment to greater disclosure should lower the cost of capital that results from information asymmetries. The authors note that greater corporate disclosure can mean an increase in the quantity of disclosure as well as an increase in the quality of disclosure, or both. A commitment by corporate insiders to increase the disclosure level is reflected in a reduced level of information asymmetry between firms and their shareholders, or among buyers and sellers of the firm's stock. Moreover, the upside is an increase in liquidity, a lesser discount at which the stock is sold, and a lower cost of equity capital.

The main provisions of SOX deal with internal control, financial reporting, board and auditor independence, and insider trading. Essentially, they deal with virtually every single aspect of a firm's governance and operations that has a financial outcome. To the extent that corporate insiders and firms that are found to be non compliant with the mandates of SOX face severe financial penalties and/or imprisonment, it can be assumed that the risk associated with disclosing inaccurate information and fraudulent behavior by firms has decreased significantly post-SOX. However, scholars and practitioners are still trying to assess whether the provisions of SOX are having the desired effect on investors, corporate insiders, and the operations of public firms.

Two hypotheses are examined. The first is that the cost of equity capital has decreased post-SOX. Zhang (2005) finds that SOX has had a negative impact on firm value. Conversely, Li et al. (2006) and Jain and Rezaee (2006) document a positive effect of SOX on firm value. To the extent that the goals of SOX are being achieved, and the legislation is having a positive impact on firm value, financial markets are enjoying less information asymmetry, and investors are facing less risk as a result, it is reasonable to hypothesize a decrease in the cost of equity capital.

The second hypothesis is that any changes in the cost of equity capital will be more significant for small firms. It has been shown that small firms are usually characterized by poor internal control systems and a high level of information asymmetry. Also, they normally attract less security analysts as well as less publicity. Therefore, it can be expected that if SOX is having a positive influence on these small firms, it will be reflected in a decrease in the risk normally associated with ineffective internal controls and a poor information environment. Subsequently, these small firms should enjoy a reduction in the cost of equity capital that is more than that experienced by their larger counterparts. The special case of small firms as they relate to SOX has been previously documented. Doyle et al. (2007) point out that increased transparency can be especially beneficial to small firms that are normally not subjected to close monitoring. This makes it prudent to specifically assess how the cost of equity capital has changed for small firms.

4.1.1 Organization

Section 4.2 reviews relevant previous research and presents this essay's contribution to the literature. Section 4.3 describes the data and methodology. Section 4.4 presents the empirical results as well as related findings, and Section 4.5 presents the conclusions and implications.

4.2 Literature Review

Given the importance of the cost of equity capital in the decision-making activities of firms, an extensive line of research has developed over the years dealing with information, corporate disclosure and the cost of equity capital. A discussion of some of this research as it pertains to this essay follows.

4.2.1 Information and the Cost of Equity Capital

Diamond (1985) investigates the optimal release of information by firms. Using a general equilibrium model with endogenous information collection, the author shows that the release of information by firms is advantageous to shareholders. He states, "The welfare improvement occurs because of explicit information cost savings and improved risk sharing." This supports the notion that more information is actually better than less because of reduced information asymmetry and subsequently, reduced risk. Moreover, this leads to a lower cost of equity capital for firms.

Easley and O'Hara (2004) examine the effect of information and a firm's information structure on the cost of capital. They document that public and private information affect the cost of equity capital differently. In addition, they show that

investors expect a higher return to hold stocks characterized by more private information. According to the authors, "Private information induces a form of systematic risk, and in equilibrium investors require compensation for bearing that risk." This suggests that firms can affect the level of their cost of equity capital by the quantity and quality of the information that is made available to investors. SOX has a direct impact on this issue as the legislation specifically addresses accounting standards, including the accuracy of financial reporting, holding Chief Executive Officers ultimately accountable for all information that a firm disseminates.

Gomes et al. (2007) investigate Regulation Fair Disclosure (Reg FD) and its impact on information and the cost of capital. They find that the implementation of Reg FD affected normal channels of information, making them more complicated, which in turn adversely affected the cost of equity capital. Interestingly, they find that small firms were more affected than large firms because security analysts stopped following these small firms, leading to an increase in their cost of equity capital.

4.2.2 Corporate Disclosure

Diamond and Verrecchia (1991) investigate the effect of corporate disclosure on liquidity and the cost of capital. The authors conjecture that under certain conditions reducing information asymmetry reduces the cost of capital. They find that by increasing public information (corporate disclosure), there is a reduction in the level of information asymmetry which in turn leads to a reduction in the cost of capital. They also conclude that corporate disclosure "reduces the risk-bearing capacity available through market makers."

The effect of corporate disclosure policy on analyst following and analyst performance is examined by Lang and Lundholm (1996). The authors find that greater analyst following and better analyst performance is associated with firms that have more transparent information disclosure policies. Further, they point out that other research has concluded that the advantages of increased corporate disclosure (reduced risk, increased investor following and reduced information asymmetry) can lead to a decrease in a firm's cost of equity capital.

Botosan (1997) investigates the effect of the corporate disclosure level on the cost of equity capital by regressing firm-specific estimates of cost of equity capital on firm size, market beta, and a self-constructed measure of disclosure level. The author reports that for firms characterized by low analyst following, increased disclosure leads to a lower cost of equity capital. However, for firms with a high level of security analyst following, the author finds no relationship between the disclosure level and the cost of equity capital. She attributes this to her measure of disclosure which she acknowledges may not be a powerful proxy for overall corporate disclosure especially when security analysts have a major role in the communication process.

Healy et al. (1999) examine stock performance and intermediation changes surrounding increases in corporate disclosure. Findings indicate that increased voluntary corporate disclosure is associated with better stock performance, increased analyst following, a higher level of institutional ownership, and higher liquidity. In addition, the authors surmise that increases in corporate disclosure correspond to increased use of debt and equity financing. Closely related to this research is the work

by Leuz and Verrecchia (2000) on the economic consequences of increased corporate disclosure. They conjecture that increased corporate disclosure should lower the cost of equity capital that result from information asymmetries. Using a cross-sectional analysis, they find that greater disclosure levels lead to benefits which are economically and statistically significant.

Botosan and Plumlee (2002) investigate the relationship between the expected cost of equity capital three types of corporate disclosure – annual report, quarterly and other published reports, and investor relations. The authors find a negative association between the cost of equity capital and the annual report disclosure level. They find no relationship between the cost of equity capital and investor relations activities. However, they find a positive relationship between the cost of equity capital and the quarterly report disclosure level. According to the authors, while this result may be contrary to what the theory predicts, it supports managers' claims that more timely disclosure increases the cost of capital because of greater stock price volatility.

4.2.3 Firm Size

Merton (1987) developed a simple model of capital market equilibrium with incomplete information. The author conjectures that small firms which receive minimal publicity have a larger than expected required return, or a higher cost of equity capital. He called this the investor recognition hypothesis. According to Merton's hypothesis, large firms have a lower cost of equity capital because these firms are usually well known and have a more efficient information environment. Conversely, small firms are

less publicized, have low security analyst following, high levels of information asymmetry, and are therefore faced with a higher cost of equity capital.

Diamond and Verrecchia (1991) in their analysis of corporate disclosure, liquidity and the cost of capital present evidence that policies that improve the information environment and lower information asymmetry will increase the liquidity of a firm's stock and lower the cost of equity capital. Since small firms are normally associated with poor information environments, one would expect a negative relationship between firm size and the cost of equity capital. Moreover, any improvements in the information environment of these small firms could result in a decrease in the cost of equity capital.

4.2.4 Contributions to the Literature

This essay examines the impact of SOX on the cost of equity capital. Specifically, the following question is investigated: How have firms' cost of equity capital changed since the implementation of the Act? Given that the cost of equity capital is fundamental to many corporate decisions, and is in part related to the very objectives that SOX is intended to achieve (e.g., improved information quality and transparency of firms' operations), this research makes an important contribution to the entire body of work dealing with corporate governance, corporate disclosure, information quality, and the cost of equity capital. The essay also contributes to the literature that examines how government intervention via legislation affects various aspects of the financial markets. Specifically, this research uses the cost of equity capital to examine the effectiveness of SOX. To date, the literature dealing with SOX is

limited, and it is not certain whether the provisions of the Act are indeed achieving their objectives. This study will add important information to the literature on the effectiveness of the legislation.

4.3 Data and Methodology

4.3.1 Description of Data and Sample Selection

The data for this study come from CRSP, I/B/E/S and COMPUSTAT. Specifically, earnings forecast data are obtained from I/B/E/S, stock price data are obtained from CRSP, and company financial data come from COMPUSTAT. The sample of firms used in the study comes from the S&P 500 Index and the S&P Small Cap 600 Index, and include only those firms that have a December fiscal year end. The time period under review is from January 1996 to December 2006. The pre-SOX period includes the years1996-2002, while the post-SOX period includes the years 2003 to 2006. This time period is chosen in order to minimize the sensitivity of the results to other macro-economic shocks in the economy.

In estimating the cost of equity capital, many different methods were considered. Previous studies have used average realized returns to estimate the cost of equity capital even though expected returns may be the more appropriate measure. This is because expected returns are not directly observable. In defense of the widespread use of average realized returns, Gebhardt et al. (2001) state, "…in an efficient market where risk is appropriately priced, the average ex post realized returns should be an unbiased estimator of the unobservable ex ante expected returns." Fama and French

(1997) used the CAPM and a three-factor model to estimate the cost of equity capital, but found that the estimates were not precise. In fact, other estimates of the cost of equity capital, including earnings to price ratio (E/P), Gordon Growth Model, and average return on equity (ROE), all have disadvantages and imperfections (Botosan (1997)). Given that academicians and practitioners have used the Gordon Growth Model in the past to estimate the cost of equity capital, this method is used in this study.[19] It is defined as follows:

$$R_i = (DIV_{i,t+1} / P_i) + g_i \qquad (1)$$

In this model (equation 1), the cost of capital is given by R, the dividend is given by DIV, the stock price is represented by P, and the growth rate is represented by g. At the end of each year, the cost of equity capital is determined by substituting the dividend, stock price and growth rate into the model.

Consistent with Gebhardt et al. (2001), a number of risk and firm characteristics are used in the panel regression analysis. For each firm, the standard deviation of returns is calculated from the previous year's monthly returns. This is a measure of the market volatility and this data are obtained from CRSP. Firm size (as measured by the book value of total assets) and the number of security analysts following a firm are used to proxy for the information environment and liquidity. The rationale is that the information environment is more efficient for larger firms than for smaller firms. Also, larger firms are normally characterized by more liquidity than smaller firms so firm size is used to proxy for liquidity. The data for the number of security analysts are obtained

[19] See Gitman and Mercurio (1982) for different methods of estimating the cost of equity capital.

from I/B/E/S, the firm size data and the trading volume data come from COMPUSTAT. In terms of earnings variability, forecast error, dispersion of analysts' forecasts, and earnings volatility are all used to capture risk in the model. The security analysts' data come from I/B/E/S. Firms being followed by a single security analyst were dropped from the sample since it would be impossible to calculate the dispersion of the analysts' forecasts. The debt ratio is used to proxy for financial leverage, and the book to market ratio is used as a proxy for risk. Data obtained from COMPUSTAT were used to compute the debt ratio, book to market ratio, and earnings volatility. Firms with missing data from the three databases were dropped from the sample.

The final sample consists of 4,642 observations, representing 422 firms. Of these firms, 230 are from the S&P 500 Index and 192 are from the S&P Small Cap Index. Approximately 37 percent of the observations are during the post-SOX period, and 46 percent of the observations represent small firms.

4.3.2 Methodology

Gebhardt et al. (2001) highlight many factors that can have an impact on the cost of equity capital. In this study, however, the primary concern is in investigating the impact of SOX on the cost of equity capital. Since panel data is being used, a model with firm fixed effects is employed to isolate the effect of SOX on the cost of equity capital, while controlling for the firm characteristics discussed above.[20] This model is appropriate because the variables are homogenous across the firms, and the firms are fixed throughout the entire sample period. In order to get the most efficient estimates,

robust *t*-statistics from a heteroskedasticity-autocorrelation consistent estimator are reported. First, the following fixed-effects regression is estimated:

$$R_{it} = a_0 + a_1 (SOX_t) + a_2 (\text{Debt Ratio}_{it}) + a_3 \ln (NAN_{it}) + a_4 (ANFE_{it})$$
$$+ a_5 \ln (\text{Disp}_{it}) + a_6 \ln (\text{Evol}_{it}) + a_7 \ln (\text{Ret Vol}_{it}) + a_8 \ln (\text{BE/ME Ratio}_{it})$$
$$+ a_9 \ln (\text{Firm Size}_{it}) + u_{it} \quad (1)$$

The variable SOX_t is a dummy variable that equals one for the post-SOX period, and zero otherwise. The debt ratio (Debt Ratio_{it}) is equal to the long-term debt divided by the total common equity at year end. Modigliani and Miller (1958) document a positive relationship between the debt ratio and cost of equity capital. Thus, we expect a positive sign on the coefficient of the debt ratio. Security analyst following (NAN_{it}) is equal to the number of analysts making a forecast for each firm. A negative sign is expected on this variable as previous research has shown that more security analyst coverage is associated with a lower cost of capital. The absolute normalized forecast error ($ANFE_{it}$) is measured as the absolute value of the difference between the consensus forecast earnings per share (EPS) for firm *i* for year *t* and the actual EPS for firm *i* for quarter *t*, divided by the absolute value of the actual EPS. Dispersion of security analysts' forecasts (Disp_{it}) is equal to the coefficient of variation of the consensus forecasts (i.e., the standard deviation of the consensus forecast earnings over the year normalized by the mean consensus forecast). Earnings volatility (Evol_{it}) is equal to the coefficient of variation of annual pre-tax income over the past two years (i.e., the standard deviation of the pre-tax income over the past two years divided by the

[20] See Wooldridge (2002) for a thorough examination of the fixed-effects model.

mean). The return volatility (Ret Vol_{it}) is calculated as the standard deviation of the previous year's monthly returns. The book to market ratio (BE/ME $Ratio_{it}$) is equal to the book value of equity divided by the market value of equity. A positive association is expected between the cost of equity capital and the forecast error, dispersion, earnings volatility and the book to market ratio. The firm size (Firm $Size_{it}$) is equal to the book value of assets. The sample is categorized into firm size quartiles with quartile 1 representing the smallest firms and quartile 4 representing the largest firms. Consistent with previous research (e.g., Brennan et al. (1993)), it is expected that smaller firms with less security analyst following will have a higher cost of equity capital.

Table 10 summarizes the descriptive statistics separately for the overall sample and for the four size groups. Panel A reports descriptive statistics for the overall sample, while Panels B and C report descriptive statistics for the size groups. For each variable, the mean, median and standard deviation (SD) are reported. Panel A shows that the average cost of equity capital (R) for the entire sample is 7%, the average number of analysts is 12.79 and the mean forecast error is 0.35. Also, the mean debt ratio is 0.58 and the mean book to market ratio is 0.44. Panels B and C show that for the smallest firm size quartile (Q1), the mean cost of equity capital is 13%, while for the largest firm size quartile (Q4), the mean cost of equity capital is 5%. In terms of security analyst coverage, the mean number of analysts for the smallest firms is 5.82 while for the largest firms, the mean number of analysts is 19.58. The findings are consistent with Brennan et al. (1993), Brenann et al. (1998), and Gebhardt et al. (2001)

who found that smaller firms with less security analyst following have a higher cost of equity capital.

4.4 Empirical Results

4.4.1 Cost of Equity Capital Results

Table 11 presents the results on the impact of SOX on security cost of equity capital. It is hypothesized that cost of equity capital has changed post-SOX. This hypothesis is motivated by the provisions of the Act, which require that public firms increase the transparency and accuracy of all of their financial operations, and improve their corporate governance systems. If the legislation is having the desired effect, and the information environment as well as investor confidence have improved, public firms will be viewed as being less risky which will subsequently impact the cost of capital.

Table 11 shows a negative and statistically significant relationship between the cost of equity capital and SOX (*t-statistic* = -1.98). This means that the cost of equity capital has decreased post-SOX providing support for the notion that the Act is beneficial to public firms. Consistent with prior studies (Brennan et al. (1998)), the results show a negative and significant association between number of security analysts, firm size and the cost of equity capital. Also, the results indicate that the cost of equity capital is positively and significantly associated with the dispersion of analysts' forecasts, earnings volatility, return volatility and the book to market ratio. However, no statistical significance was found between the cost of equity capital and the debt ratio as well as the forecast error.

4.4.2 Cost of Equity Capital Results by Firm Size

Table 12 presents the results on the effect of SOX on the cost of equity capital. The hypothesis is that the effect of SOX on the cost of equity capital post-SOX for small firms will be different from the effect on large firms. Panel A shows the results for quartile 1, which represents the smallest firms based on the book value of assets. A negative and significant sign on the SOX dummy variable provides evidence that the cost of equity capital for small firms have decreased post-SOX (*t-statistic* = -1.83). The results lend empirical support to the view that there has indeed been an improvement in the overall operations of firms post-SOX. This is being reflected in a decrease in the perceived riskiness of public firms and in turn, a decrease in the cost of equity capital. In this quartile, the findings also show that the cost of equity capital has a negative and significant relationship with security analyst following and firm size. No significance was reported with any of the other variables.

Panel B presents the results for quartile 2. The results are consistent with the previous findings in this study. For this group of firms, the cost of equity capital has decreased post-SOX (*t-statistic* = -2.56). In terms of the other variables, the cost of equity capital is positively and significantly associated with the debt ratio and the dispersion of analysts' forecasts, and negatively associated with firm size and the number of security analysts. No statistically significant relationship is found with the other variables.

The results for quartile 3 are presented in Panel C. Supporting the earlier findings, the cost of equity capital has decreased post-SOX in this group of larger firms

(*t-statistic* = -4.90). The results also show a negative and significant association between the cost of equity capital and the number of security analysts as well as the firm size. A positive and significant relationship is reported between the cost of equity capital and the debt ratio, the security analysts' forecast error, and the book to market ratio. The relationship with the other variables is not statistically significant.

The largest firms are represented in Quartile 4, and the findings are similar to what has been presented. A decrease in the cost of equity capital is recorded post-SOX (*t-statistic* = -2.53). In terms of the other variables, the findings for this group of firms indicate a positive and significant relationship between the cost of equity capital and the debt ratio, the forecast error, the dispersion of security analysts' forecast errors, and return volatility. A negative and significant relationship is reported between the cost of equity capital and the number of security analysts as well as the firm size. No statistical significance is reported with the other variables in the model.

The reduction in the cost of equity capital post-SOX differs across the quartiles, with the largest changes being reported in quartiles 2 and 3 (-0.20 and -0.22, respectively). The decrease in the cost of equity capital for the smallest and largest firms is -0.05 and -0.11, respectively. These results are not surprising for two primary reasons. (1) Even with the implementation of the provisions of SOX, investors may still view the smallest firms as being more risky than other firms. Therefore, the small decrease in the cost of equity capital supports the hypothesis that very small firms (similar to the ones in quartile 1) are still viewed as being very risky. (2) The internal control systems, financial operations, and the information environment of the largest

firms were already very efficient before SOX was enacted. As such, the changes post-SOX for these firms are not as significant as the changes for the firms in quartiles 2 and 3, which may have benefited more from the provisions of SOX.

4.5 Conclusions and Implications

The effect of SOX on the cost of equity capital is a matter of considerable importance and interest to corporate insiders, investors, security analysts, and indeed all market participants. The benefits and costs of the Act are still being heavily debated primarily because they have not been properly established and quantified. This essay presents empirical evidence of the effect of SOX on the cost of equity capital. For a sample of 396 firms, the findings suggest that the cost of equity capital has decreased post-SOX. The results hold throughout the groups of small to large firms.

The evidence in this study supports the view that SOX has had a positive impact on the overall riskiness of firms, which is being reflected in a lower cost of equity capital. Investors, and other proponents of the Act, highlight the point that SOX's main objective of improving the accuracy and quality of financial reporting would benefit the information environment, corporate governance and management, thereby increasing investor confidence and protecting the capital markets. Moreover, they felt that misconduct by insiders would be reduced because of increased transparency, leading to growth, wise risk-taking, increased confidence in the capitalist system, higher rates of investment and economic progress. The empirical evidence presented here on the

impact of SOX on the cost of equity capital supports the arguments put forth by investors and other proponents of the Act.

This essay also sheds some light on the ongoing debate about the impact of SOX on the welfare of small firms. Opponents believe that the costs of compliance are too burdensome for these small firms to realize any benefits. Proponents, on the other hand, hold the view that SOX will improve the efficiency of these small firms. The findings presented here give credence to the view that SOX has had a positive impact on small firms. The decrease in the cost of equity capital experienced by the groups of small firms supports the notion that smaller firms do indeed stand to benefit from the provisions of SOX.

The evidence presented here adds to the growing body of research on the impact of SOX on various aspects of the financial markets. This essay fills a gap in the literature by adding critical information to the ever growing debate about the role of legislation in the U.S. financial markets.

CHAPTER 5

OVERALL SUMMARY AND CONCLUSIONS

5.1 Overall Summary

Three problem areas dealing with the impact of SOX on security analysts' performance, security analysts' monitoring active and firm value, and the cost of equity capital are developed in three individual essays. In all three essays, differences between small and large firms are identified, and in the first essay, industry effects are also examined.

In the first essay, fixed effects regression analysis was applied to a sample of 254 U. S. firms to examine the impact of SOX on security analysts' performance. The results indicate that security analysts' performance has deteriorated post-SOX. The forecast errors have increased and security analysts have become more pessimistic in their earnings forecasts. This finding is apparent for small and large firms throughout the post-SOX period, as well as for firms across industries.

In the second essay, three-stage least squares regression analysis is applied to a comprehensive set of 422 U. S. firms to investigate the impact of SOX on security analysts' monitoring activity and firm value. The findings show that while firm value has increased, there has been a reduction in security analysts' monitoring activity post-

SOX. The results hold for both large and small firms; however, the increase in firm value for the small firms is greater than the increase for the large firms.

Finally, the third essay examines changes in the cost of equity capital post-SOX. Using fixed effects regression analysis on a sample of 396 U. S. firms, the results indicate that the cost of equity capital has decreased post-SOX. Also, after categorizing the firms into quartiles, the findings show that the decrease in the cost of capital is less significant in the two quartiles representing the smallest and largest firms.

5.2 Overall Conclusions

Overall this study demonstrates that SOX has had a positive impact on U. S. public firms even though security analysts' forecasting performance has not improved post-SOX. The security analysts' performance essay (Chapter 2) indicates that the provisions of SOX are not being reflected in improved security analysts' forecasting performance. Moreover, security analysts are reacting to the more conservative nature of management and other corporate insiders by becoming more pessimistic in their earnings forecasts post-SOX. The implementation of SOX was preceded less than two years earlier by Reg FD, which directly affected the way security analysts had conducted business for a very long time. Therefore, these security analysts may still be going through an adjustment phase, and may need some more time in order to take full advantage of the provisions (e.g., increased transparency and accuracy of financial reporting) of SOX.

The security analysts' monitoring activity and firm value essay (Chapter 3) shows that SOX has had a positive impact on U. S. firms. The increase in corporate value is a benefit that both shareholders and corporate insiders value. The decrease in security analysts' monitoring activity is not surprising since the legislation itself acts as a monitoring mechanism, and a substitute for security analysts' monitoring. Therefore, overall monitoring has not decreased, which is evident by the increase in firm value.

The cost of equity capital essay (Chapter 4) shows that the cost of equity capital has decreased post-SOX, which indicates that SOX has had an impact on decreasing the risk associated with firms. This supports the view held by investors, and other proponents of the Act, who felt that the legislation would improve the accuracy and quality of financial reporting, the information environment, and corporate governance leading to higher rates of investment and wise risk-taking.

5.3 Items for Future Study

Throughout the study, several items for future research are identified. The overall results warrant a more extensive examination into the impact of SOX on different aspects of the financial markets. At present, there is an ongoing debate about the relevance of legislation in the financial markets, and how much legislation is optimal for the efficient running of the financial markets. First, the post-SOX period in the study could be extended as time goes by to obtain a longer time horizon and a better perspective of how SOX has impacted security analysts' performance, security analysts' monitoring activity, firm value and the cost of equity capital. Second, an investigation

into the industry effect of security analysts' monitoring activity, firm value, and the cost of equity capital post-SOX would be pertinent to the literature. Third, more extensive measures of the cost of equity capital could be used to some more light on how SOX has impacted that figure. Finally, the sample used in this study only included firms from the S&P 500 Index and S&P Small Cap 600 Index. The sample could also be broadened to include firms from other indices.

APPENDIX A

LIST OF FIGURES

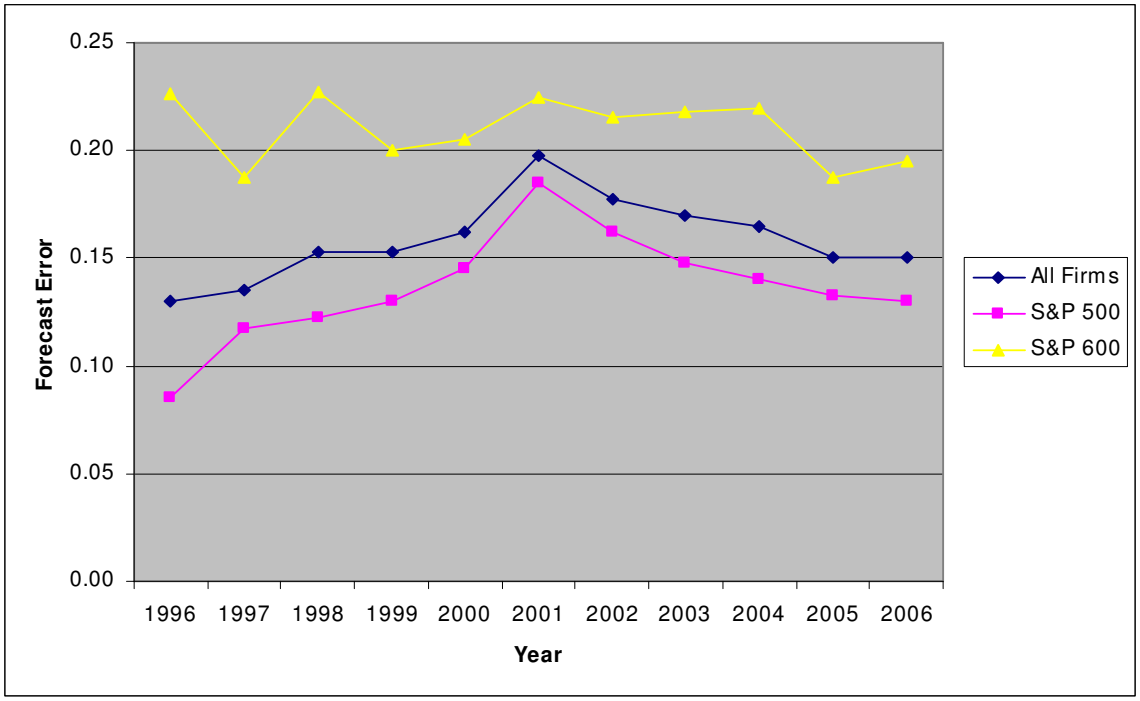

Figure 1
Absolute Normalized Forecast Error, 1996-2006

Note: The absolute normalized forecast error is calculated as $ANFE_{jt} = |\tilde{eps}_{jt} - eps_{jt}| / |eps_{jt}|$.

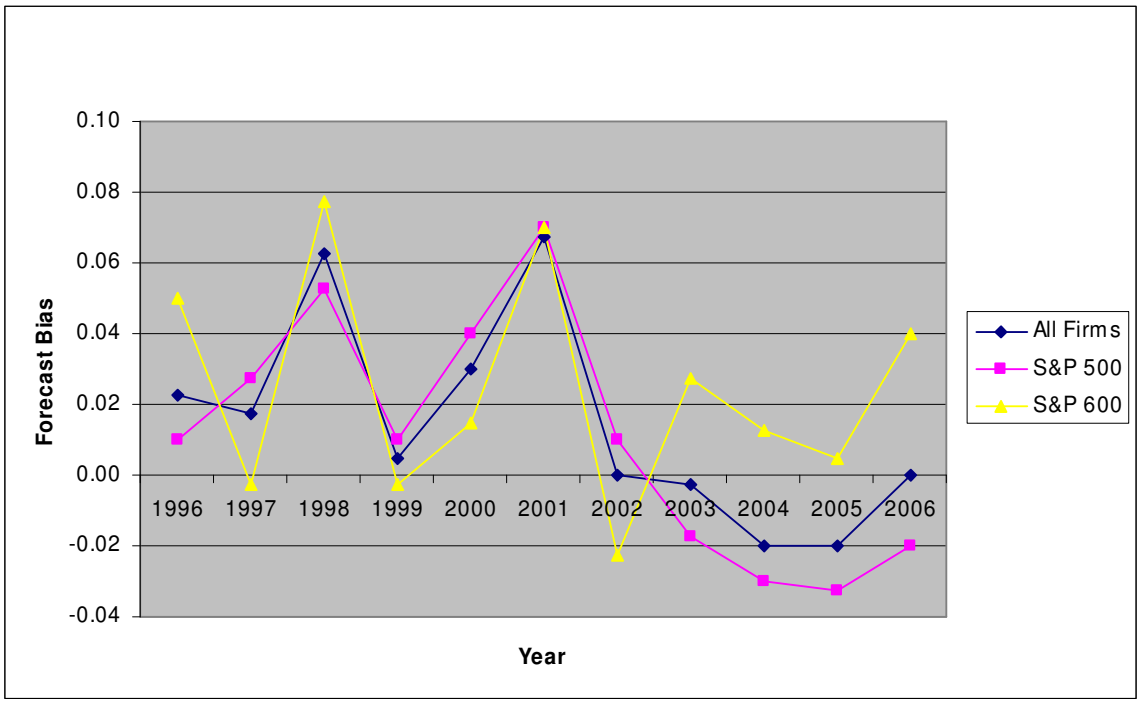

Figure 2
Consensus Forecast Bias, 1996-2006

Note: The forecast bias is calculated as $FB_{jt} = e\tilde{p}s_{jt} - eps_{jt} / |eps_{jt}|$.

APPENDIX B

LIST OF TABLES

Table 1
Descriptive Statistics of Sample (Essay 1)

Note: The table shows descriptive statistics of earnings per share (EPS), absolute normalized forecast errors (ANFE), forecast bias (FB), dispersion (DISP), number of analysts (NAN), number of company executives (NEXEC), earnings volatility (EVOL), losses (LOSS) and the dummy variable POSTSOX. $ANFE_{jt} = |\tilde{eps}_{jt} - eps_{jt}| / |eps_{jt}|$, where $\tilde{eps}_{jt}$ equals the consensus forecast EPS for company j for quarter t, eps_{jt} equals the actual EPS for company j for quarter t. $FB_{jt} = \tilde{eps}_{jt} - eps_{jt} / |eps_{jt}|$. The dummy variable, $POSTSOX_t$, is equal to one if the forecast period is within the post-SOX period and zero otherwise. The variable $LOSS_{jt}$ is a dummy variable that equals one if $eps_{jt} < 0$ and zero otherwise. The earnings volatility variable (EVOL) is the coefficient of variation of pretax income (COMPUSTAT item #23) over the four quarters preceding the end of the quarter at which the earnings forecast is measured. $DISP_{jt}$ is measured as the coefficient of variation of the consensus forecasts (i.e. the standard deviation of the consensus forecast earnings normalized by the mean consensus forecast). In the correlation matrix and the subsequent regressions, the log of NAN (LNAN) and the log of NEXEC (LNEXEC) are used. Actual EPS observations equal to zero were omitted from the sample; in order to minimize the effect that extreme observations may have on any inferences, forecast errors with values greater than two were omitted.

*** Denotes statistical significance at the 1% level in two-tailed tests.
** Denotes statistical significance at the 5% level in two-tailed tests.
* Denotes statistical significance at the 10% level in two-tailed tests.

Panel A: All Firms

Variable	Mean	Median	SD	N
EPS	0.46	0.40	0.46	11, 153
ANFE	0.16	0.06	0.26	11, 153
FB	0.02	-0.01	0.31	11, 153
POSTSOX	0.39	0	0.49	11, 153
NAN	10.56	10	6.54	11, 153
NEXEC	6.23	6	1.36	11, 153
DISP	0.03	0.02	0.05	11, 153
LOSS	0.05	0	0.22	11, 153
EVOL	0.38	0.24	0.37	11, 153

Table 1 cont'd

Panel B: Firms by Size

Variable	Mean		Median		SD		N	
	Large	Small	Large	Small	Large	Small	Large	Small
EPS	0.53	0.30	0.47	0.24	0.47	0.40	7686	3467
ANFE	0.14	0.21	0.05	0.10	0.24	0.30	7686	3467
FB	0.01	0.03	-0.01	-0.02	0.27	0.37	7686	3467
POSTSOX	0.39	0.39	0	0	0.49	0.49	7686	3467
NAN	12.06	7.23	11	6	6.27	5.86	7686	3467
NEXEC	6.43	5.79	6	6	1.35	1.26	7686	3467
DISP	0.03	0.02	0.02	0.01	0.05	0.04	7686	3467
LOSS	0.03	0.10	0	0	0.18	0.30	7686	3467
EVOL	0.39	0.35	0.25	0.22	0.37	0.36	7686	3467

Panel C: Pearson Correlations

	POSTSOX	LNAN	DISP	LNEXEC	LOSS	EVOL
POSTSOX	1.0000					
LNAN	0.1656***	1.0000				
DISP	0.1066***	0.0216***	1.0000			
LNEXEC	-0.2383***	0.0354***	0.0231**	1.0000		
LOSS	-0.0264***	0.1284***	0.1769***	0.0259**	1.0000	
EVOL	-0.0153*	0.0389***	0.0580***	0.0792***	0.0567***	1.0000

Table 2
Absolute Normalized Forecast Errors and Forecast Bias for the Pre- and Post-SOX Periods

Note: The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the I/B/E/S databases and have a December fiscal year end. Actual EPS observations equal to zero are omitted from the sample, and in order to minimize the effect that extreme observations may have on any inferences, forecast errors with values greater than two are also omitted. The absolute normalized forecast error is calculated as $ANFE_{jt} = |\tilde{eps}_{jt} - eps_{jt}| / |eps_{jt}|$, where $\tilde{eps}_{jt}$ equals the consensus forecast EPS for company j for quarter t, and eps_{jt} equals the actual EPS for company j for quarter t. $FB_{jt} = \tilde{eps}_{jt} - eps_{jt} / |eps_{jt}|$. The pre-SOX period includes quarters ending between March 1996 and September 2002, and the post-SOX period extends from quarters ending December 2002 to December 2006. The *p*-values are based on the two-tailed *t*-tests for means.
*** Denotes statistical significance at the 1% level in two-tailed tests.
**Denotes statistical significance at the 5% level in two-tailed tests.

Panel A: All Firms

Quarter	Pre-SOX ANFE	Post-SOX ANFE	*p*-Value	Pre-SOX FB	Post-SOX FB	*p*-Value
March	0.150	0.180	0.02**	-0.004	-0.024	0.102
June	0.150	0.150	0.44	0.012	-0.023	0.002***
September	0.160	0.150	0.48	0.055	0.004	0.000***
December	0.170	0.160	0.33	0.064	0.007	0.000***

Panel B: S&P 500 Firms

Quarter	Pre-SOX ANFE	Post-SOX ANFE	*p*-Value	Pre-SOX FB	Post-SOX FB	*p*-Value
March	0.13	0.16	0.04**	0.003	-0.039	0.002***
June	0.12	0.13	0.20	0.013	-0.030	0.000***
September	0.13	0.14	0.78	0.050	-0.015	0.000***
December	0.14	0.13	0.46	0.060	-0.003	0.000***

Table 2 cont'd

Panel C: S&P 600 Firms

Quarter	Pre-SOX ANFE	Post-SOX ANFE	*p*-Value	Pre-SOX FB	Post-SOX FB	*p*-Value
March	0.20	0.23	0.03**	-0.020	0.009	0.272
June	0.20	0.20	0.73	0.011	-0.007	0.469
September	0.22	0.19	0.16	0.066	0.045	0.414
December	0.22	0.21	0.51	0.072	0.029	0.094

Table 3
Regressions of the Absolute Normalized Forecast Errors and the Forecast Bias

Note: The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the I/B/E/S
databases and have a December fiscal year end. Actual EPS observations equal to zero are omitted from the sample, and in order to minimize the effect that extreme observations may have on any inferences, forecast errors with values greater than two are also omitted. The dummy variable, $POSTSOX_t$, is equal to one if the forecast period is within the post-SOX period and zero otherwise. The variable $LOSS_{jt}$ is a dummy variable that equals one if $eps_{jt} < 0$ and zero otherwise. The earnings volatility variable (EVOL) is the coefficient of variation of pretax income (COMPUSTAT item #23) over the four quarters preceding the end of the quarter at which the earnings forecast is measured. $DISP_{jt}$ is measured as the coefficient of variation of the consensus forecasts (i.e., the standard deviation of the consensus forecast earnings normalized by the mean consensus forecast). The log of NAN (LNAN) is equal to the log of the number of analysts, and the log of NEXEC (LNEXEC) is the log of the number of company executives. Reported t-statistics are from a robust variance estimator.
*** Denotes statistical significance at the 1% level in two-tailed tests.
** Denotes statistical significance at the 5% level in two-tailed tests.

Panel A: $FE_{jt} = b_0 + b_1 POSTSOX_t + b_2 DISP_{jt} + b_3 LNAN_{jt} + b_4 LNEXEC_{jt} + b_5 EVOL_{jt} + b_6 LOSS_{jt} + u_{jt}$

Variable	**Coefficient**	***t*-Statistics**
POSTSOX	0.0174	3.54***
LNAN	-0.0333	-5.67***
LNEXEC	0.0159	4.10***
DISP	0.2456	2.37**
LOSS	0.3885	14.67***
EVOL	0.0297	3.52***
Adjusted R^2	0.20	
Total # of observations	11,153	

Table 3 cont'd

Panel B: $FB_{jt} = b_0 + b_1\,POSTSOX_t + b_2\,DISP_{jt} + b_3\,LNAN_{jt} + b_4\,LNEXEC_{jt} + b_5\,EVOL_{jt} + b_6\,LOSS_{jt} + u_{jt}$

Variable	**Coefficient**	***t*-Statistics**
POSTSOX	-0.0315	-5.11***
LNAN	0.0362	4.74***
LNEXEC	0.0740	4.51***
DISP	0.0192	2.47**
LOSS	0.4481	12.44***
EVOL	0.0002	0.77
Adjusted R^2	0.06	
Total # of observations	11,153	

Table 4
Regressions of the Absolute Normalized Forecast Errors and the Forecast Bias: Effects Based on Firm Size

Note: The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the I/B/E/S databases and have a December fiscal year end. Actual EPS observations equal to zero are omitted from the sample, and in order to minimize the effect that extreme observations may have on any inferences, forecast errors with values greater than two are also omitted. The variable, $SMALLFIRM_j$ equals one if the firm is part of the S&P 600 group of firms, and zero otherwise. The variable $LARFIRM_j$ equals one if the firm is part of the S&P 500 group of firms, and zero otherwise. The dummy variable, $POSTSOX_t$, is equal to one if the forecast period is within the post-SOX period and zero otherwise. The variable $LOSS_{jt}$ is a dummy variable that equals one if $eps_{jt} < 0$ and zero otherwise. Earnings volatility (EVOL) is the coefficient of variation of pretax income (COMPUSTAT item #23) over the four quarters preceding the end of the quarter at which the earnings forecast is measured. $DISP_{jt}$ is measured as the coefficient of variation of the consensus forecasts (i.e., the standard deviation of the consensus forecast earnings normalized by the mean consensus forecast). LNAN is equal to the log of the number of analysts, and LNEXEC is the log of the number of company executives. Reported t-statistics are from a robust variance estimator.
*** Denotes statistical significance at the 1% level in two-tailed tests.
** Denotes statistical significance at the 5% level in two-tailed tests.

Panel A: $FE_{jt} = b_0 + b_1 POSTSOX_t * SMALLFIRM_j + b_2 POSTSOX_t * LARFIRM_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}$

Variable	**Coefficient**	***t*-Statistics**
SMALLFIRM	0.0181	2.24**
LARFIRM	0.0171	3.41***
p-value for difference	*(0.9247)*	
LNAN	-0.0334	-5.56***
LNEXEC	0.0518	4.09***
DISP	0.2454	2.36**
LOSS	0.3885	14.65***
EVOL	0.0297	3.52***
Adjusted R^2	0.20	
Total # of observations	11,153	

Table 4 cont'd

Panel B: $FB_{jt} = b_0 + b_1 POSTSOX_t * SMALLFIRM_j + b_2 POSTSOX_t * LARFIRM_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}$

Variable	**Coefficient**	***t*-Statistics**
SMALLFIRM	-0.0021	-0.17
LARFIRM *p-value for difference*	-0.0511 *(0.0001)*	-7.85***
LNAN	0.0296	3.78***
LNEXEC	0.0653	3.98***
DISP	0.3888	3.04***
LOSS	0.4621	13.13***
EVOL	0.0001	0.40
Adjusted R^2	0.06	
Total # of observations	11,153	

Table 5
Regressions of the Absolute Normalized Forecast Errors and the Forecast Bias: Industry Effects

Note: The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the I/B/E/S databases and have a December fiscal year end. Actual EPS observations equal to zero are omitted from the sample, and in order to minimize the effect that extreme observations may have on any inferences, forecast errors with values greater than two are also omitted. The variable, $SMALLFIRM_j$ equals one if the firm is part of the S&P 600 group of firms, and zero otherwise. The variable $LARFIRM_j$ equals one if the firm is part of the S&P 500 group of firms, and zero otherwise. The dummy variable, $POSTSOX_t$, is equal to one if the forecast period is within the post-SOX period and zero otherwise. The variable $LOSS_{jt}$ is a dummy variable that equals one if $eps_{jt} < 0$ and zero otherwise. Earnings volatility (EVOL) is the coefficient of variation of pretax income (COMPUSTAT item #23) over the four quarters preceding the end of the quarter at which the earnings forecast is measured. $DISP_{jt}$ is measured as the coefficient of variation of the consensus forecasts (i.e., the standard deviation of the consensus forecast earnings normalized by the mean consensus forecast). LNAN is equal to the log of the number of analysts, and LNEXEC is the log of the number of company executives. Reported t-statistics are from a robust variance estimator.
*** Denotes statistical significance at the 1% level in two-tailed tests.
** Denotes statistical significance at the 5% level in two-tailed tests.

Panel A: $FE_{jt} = b_0 + b_1 POSTSOX_t * TCSIND_j + b_2 POSTSOX_t * OTHIND_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}$

Variable	**Coefficient**	***t*-Statistics**
TCSIND	0.0232	3.15***
OTHIND	0.0131	2.20**
p-value for difference	*(0.2527)*	
LNAN	-0.0332	-5.64***
LNEXEC	0.0158	4.09***
DISP	0.2465	2.38**
LOSS	0.3885	14.68***
EVOL	0.0297	3.52***
Adjusted R^2	0.20	
Total # of observations	11,153	

Table 5 cont'd

Panel B: $FB_{jt} = b_0 + b_1 POSTSOX_t * TCSIND_j + b_2 POSTSOX_t * OTHIND_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}$

Variable	**Coefficient**	***t*-Statistics**
TCSIND	-0.0198	2.11**
OTHIND *p-value for difference*	-0.0485 *(0.0113)*	-6.37***
LNAN	0.0339	4.40***
LNEXEC	0.0709	4.30***
DISP	0.3971	3.10***
LOSS	0.4581	12.94***
EVOL	0.0002	0.02
Adjusted R^2	0.06	
Total # of observations	11,153	

Table 6
Regressions of the Absolute Normalized Forecast Errors and the Forecast Bias: Effects Based on Post-SOX Time Periods

Note: The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the I/B/E/S databases and have a December fiscal year end. Actual EPS observations equal to zero are omitted from the sample, and in order to minimize the effect that extreme observations may have on any inferences, forecast errors with values greater than two are also omitted. The variable, $SMALLFIRM_j$ equals one if the firm is part of the S&P 600 group of firms, and zero otherwise. The variable $LARFIRM_j$ equals one if the firm is part of the S&P 500 group of firms, and zero otherwise. The dummy variable, $POSTSOX_t$, is equal to one if the forecast period is within the post-SOX period and zero otherwise. The variable $LOSS_{jt}$ is a dummy variable that equals one if $eps_{jt} < 0$ and zero otherwise. Earnings volatility (EVOL) is the coefficient of variation of pretax income (COMPUSTAT item #23) over the four quarters preceding the end of the quarter at which the earnings forecast is measured. $DISP_{jt}$ is measured as the coefficient of variation of the consensus forecasts (i.e., the standard deviation of the consensus forecast earnings normalized by the mean consensus forecast). LNAN is equal to the log of the number of analysts, and LNEXEC is the log of the number of company executives. Reported t-statistics are from a robust variance estimator.
*** Denotes statistical significance at the 1% level in two-tailed tests.
** Denotes statistical significance at the 5% level in two-tailed tests.

Panel A: $FE_{jt} = b_0 + b_1 POSTSOX_t * EARLY_j + b_2 POSTSOX_t * LATE_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}$,

Variable	**Coefficient**	***t*-Statistics**
EARLY	0.0192	3.20***
LATE	0.0151	2.54**
p-value for difference	*(0.5552)*	
LNAN	-0.0330	-5.58***
LNEXEC	0.0500	3.84***
DISP	0.2499	2.39**
LOSS	0.3881	14.64***
EVOL	0.0295	3.54***
Adjusted R^2	0.20	
Total # of observations	11, 153	

Table 6 cont'd

Panel B: $FB_{jt} = b_0 + b_1 POSTSOX_t * EARLY_j + b_2 POSTSOX_t * LATE_j + b_3 DISP_{jt} + b_4 LNAN_{jt} + b_5 LNEXEC_{jt} + b_6 EVOL_{jt} + b_7 LOSS_{jt} + u_{jt}$,

Variable	**Coefficient**	***t*-Statistics**
EARLY	-0.0389	-5.12***
LATE *p-value for difference*	-0.0325 *(0.4646)*	4.19***
LNAN	0.0329	4.24***
LNEXEC	0.0742	4.37***
DISP	0.3869	3.00***
LOSS	0.4585	12.92***
EVOL	0.0005	0.05
Adjusted R^2	0.06	
Total # of observations	11, 153	

Table 7
Descriptive Statistics of Sample (Essay 2)

Note: The table shows descriptive statistics of number of analysts (NAN), Tobin's *q* (market value of equity + assets – book value of equity), debt ratio (long-term debt/common equity), advertising ratio (advertising expenditure/total sales), R&D ratio (R&D expenditure/total sales), share price, dispersion (coefficient of variation of the consensus forecasts over the year), return variance (the variance of the monthly stock returns for each firm over the year), trading volume (the mean of the monthly dollar trading volume over the year), return to capital (net operating income/ (total assets - cash + investments)), firm size (book value of total assets), the number of shareholders, and the dummy variable SOX., which is equal to one if the forecast period is within the post-SOX period and zero otherwise. Firms are also put into quartiles depending on their level of total assets. Quartile 1(Q1) represents the smallest firms while quartile 4 (Q4) represents the largest firms. In order to achieve better model specification, the reciprocal of price as well as the log of NAN, Tobin's q, number of shareholders, trading volume, dispersion, and firm size are used in the regressions. Observations where NAN<2 were dropped from the sample since it would not be possible to calculate the dispersion. The number of shareholders is reported in thousands, the trading volume is reported in thousands of dollars, and the firm size is reported in millions of dollars.

Panel A: All Firms

Variable	Mean	Median	SD
NAN	12.24	11	8.38
Tobin's *q*	2.10	1.56	1.65
Debt Ratio	0.82	0.46	7.83
Advert Ratio	0.01	0	0.02
R&D Ratio	0.08	0	0.57
Share Price	36.40	32.37	22.18
Dispersion	0.04	0.02	0.63
Return Variance	7.73	1.06	34.80
Trading Volume	14,136.01	3,485.54	39,240.72
Return to Capital	0.06	0.06	0.18
Firm Size	19,683.98	2,765.80	78,648.45
Shareholders	45.73	8.26	162.60
SOX	0.37	0	0.48

Table 7 cont'd

Panel B: Firms by Size(Quartiles 1 and 2)

Variable	Mean		Median		SD	
	Q1	Q2	Q1	Q2	Q1	Q2
NAN	5.34	8.92	4	8	3.80	5.59
Tobin's *q*	2.29	2.13	1.75	1.36	1.69	1.78
Debt Ratio	0.44	0.62	0.16	0.49	2.00	3.72
Advert Ratio	0.01	0.01	0	0	0.02	0.02
R&D Ratio	0.21	0.04	0	0	1.11	0.15
Share Price	20.64	32.67	18.14	30.17	13.61	18.28
Dispersion	0.02	0.06	0.03	0.02	0.49	0.85
Return Variance	2.33	3.39	0.50	0.95	4.12	4.97
Trading Volume	887.7	3673.0	366.5	1721.3	1554.3	6672.0
Return to Capital	0.03	0.07	0.07	0.06	0.34	0.06
Firm Size	352.6	1488.9	342.0	1350.9	175.7	602.1
Shareholders	3.86	7.86	1.65	3.63	5.33	11.73
SOX	0.26	0.39	0	0	0.44	0.49

Panel C: Firms by Size(Quartiles 3 and 4)

Variable	Mean		Median		SD	
	Q3	Q4	Q3	Q4	Q3	Q4
NAN	15.07	19.36	14	19	7.37	7.85
Tobin's *q*	2.00	1.99	1.63	1.53	1.68	1.41
Debt Ratio	0.62	1.27	0.49	0.68	3.72	14.33
Advert Ratio	0.01	0.01	0	0	0.03	0.02
R&D Ratio	0.03	0.03	0	0	0.06	0.06
Share Price	41.70	50.06	39.49	47.52	19.90	23.79
Dispersion	0.05	0.03	0.02	0.02	0.25	0.76
Return Variance	4.31	4.79	1.64	1.89	5.44	5.75
Trading Volume	12305.1	38699.3	6152.3	18067.0	24209.1	67026.5
Return to Capital	0.08	0.06	0.07	0.05	0.05	0.05
Firm Size	6027.2	70559.3	5516.9	26707.2	2491.4	145452.9
Shareholders	26.33	144.87	13	54.99	48.24	299.90
SOX	0.38	0.45	0	0	0.49	0.50

Table 8
3SLS Regression of Security Analysts' Monitoring Activity and Firm Value

Note: The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the CRSP, I/B/E/S, and COMPUTSAT databases and have a December fiscal year end. The variables are the number of analysts (NAN), Tobin's *q* (market value of equity + assets – book value of equity), debt ratio (long-term debt/common equity), advertising ratio (advertising expenditure/total sales), R&D ratio (R&D expenditure/total sales), share price, dispersion (coefficient of variation of the consensus forecasts over the year), return variance (the variance of the monthly stock returns for each firm over the year), trading volume (the mean of the monthly dollar trading volume over the year), return to capital (net operating income/ (total assets - cash + investments)), firm size (book value of total assets), the number of shareholders, and the dummy variable SOX., which is equal to one if the forecast period is within the post-SOX period and zero otherwise. Firms are also put into quartiles depending on their level of total assets. Quartile 1(Q1) represents the smallest firms while quartile 4 (Q4) represents the largest firms. Observations where NAN<2 were dropped from the sample since it would not be possible to calculate the dispersion. The number of shareholders is reported in thousands, the trading volume is reported in thousands of dollars, and the firm size is reported in millions of dollars.
*** Denotes statistical significance at the 1% level in two-tailed tests.

Panel A: Security Analyst Monitoring Activity(NAN)

Variable	**Coefficient**	***t*-Statistics**
ln (*q*)	0.5213	6.36***
Debt Ratio	-0.0526	-2.92***
Advert Ratio	1.490	1.39
R&D Ratio	1.959	3.04***
1/Share Price	0.0653	0.15
ln (Return Variance)	0.004	1.50
ln (Trading Volume)	0.053	2.82***
ln (Firm Size)	1.490	10.21***
SOX	-0.1127	-8.51***
Adjusted R^2	0.14	

Table 8 cont'd

Panel B: Firm Value (Tobin's q)

Variable	**Coefficient**	***t*-Statistics**
ln (NAN)	3.533	5.01***
Debt Ratio	0.2065	2.63***
Advert Ratio	6.055	1.57
R&D Ratio	0.4481	12.44***
ln (Dispersion)	-0.0976	-3.50***
ln (Shareholders)	0 .216	3.27***
Return to Capital	0.6309	0.58
ln (Firm Size)	-0.7261	-5.09***
SOX	0.4286	4.49***
Adjusted R^2	0.16	

Table 9
3SLS Regression of Security Analysts' Monitoring Activity and Firm Value by Firm Size

The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the CRSP, I/B/E/S, and COMPUTSAT databases and have a December fiscal year end. The variables are the number of analysts (NAN), Tobin's *q* (market value of equity + assets – book value of equity), debt ratio (long-term debt/common equity), advertising ratio (advertising expenditure/total sales), R&D ratio (R&D expenditure/total sales), share price, dispersion (coefficient of variation of the consensus forecasts over the year), return variance (the variance of the monthly stock returns for each firm over the year), trading volume (the mean of the monthly dollar trading volume over the year), return to capital (net operating income/ (total assets - cash + investments)), firm size (book value of total assets), the number of shareholders, and the dummy variable SOX., which is equal to one if the forecast period is within the post-SOX period and zero otherwise. Firms are also put into quartiles depending on their level of total assets. Quartile 1(Q1) represents the smallest firms while quartile 4 (Q4) represents the largest firms. Observations where NAN<2 were dropped from the sample since it would not be possible to calculate the dispersion. The number of shareholders is reported in thousands, the trading volume is reported in thousands of dollars, and the firm size is reported in millions of dollars. ***, **, and * denote statistical significance at the 1%, 5% and 10% level, respectively in two-tailed tests.

Panel A: Quartile 1

Variable	**NAN Coefficient**	**NAN *t*-Statistics**	**Tobin's *q* Coefficient**	**Tobin's *q* *t*-Statistics**
ln (NAN)			1.4783	5.16***
ln (*q*)	0.1809	1.73		
Debt Ratio	-0.0031	-0.07	-0.0092	-0.13
Advert Ratio	-0.0339	-0.01	1.0203	0.24
R&D Ratio	0.8547	0.74	-1.6787	-0.97
1/Share Price	0.3564	0.38		
ln (Dispersion)			-0.0505	-2.73***
ln (Return Variance)	0.0033	0.48		
ln (Trading Volume)	0.1130	2.57***		
Return to Capital			3.8846	5.02***
ln (Firm Size)	0.1806	1.91*	-0.4194	-3.26***
ln (Shareholders)			-0.0491	-1.08
SOX	-0.0950	-3.05***	0.1342	2.83***
Adjusted R^2	0.09			

Table 9 cont'd

Panel B: Quartile 2

Variable	**NAN Coefficient**	**NAN *t*-Statistics**	**Tobin's *q* Coefficient**	**Tobin's *q* *t*-Statistics**
ln (NAN)			1.5651	1.69*
ln (*q*)	0.9708	4.28*		
Debt Ratio	-0.0438	-1.00	0.0063	0.08
Advert Ratio	-2.1523	-0.88	5.699	1.34
R&D Ratio	-0.4750	-0.23	0.2691	0.08
1/Share Price	2.1671	1.98**		
ln (Dispersion)			-0.0440	-1.15
ln (Return Variance)	0.0142	2.17**		
ln (Trading Volume)	0.1517	2.88***		
Return to Capital			2.4192	1.47
ln (Firm Size)	0.4610	4.46***	-0.3091	-2.02**
ln (Shareholders)			-0.0370	-0.67
SOX	-0.0935	-2.76***	0.2169	1.70*
Adjusted R^2	0.08			

Table 9 cont'd

Panel C: Quartile 3

Variable	**NAN Coefficient**	**NAN *t*-Statistics**	**Tobin's *q* Coefficient**	**Tobin's *q* *t*-Statistics**
ln (NAN)			0.6427	2.29**
ln (*q*)	0.4170	2.79***		
Debt Ratio	-0.0770	-2.51***	0.0186	0.54
Advert Ratio	9.3005	4.44***	7.2853	2.30**
R&D Ratio	2.6569	2.19**	-0.7919	-0.65
1/Share Price	-1.1094	-1.54		
ln (Dispersion)			-0.0067	-0.65
ln (Return Variance)	0.0001	0.01		
ln (Trading Volume)	0.1081	2.90***		
Return to Capital			3.7538	8.87***
ln (Firm Size)	0.2496	4.21***	-0.0348	-0.92
ln (Shareholders)			0.0812	1.94*
SOX	-0.0967	-3.76***	0.0338	1.88*
Adjusted R^2	0.09			

Table 9 cont'd

Panel D: Quartile 4

Variable	**NAN Coefficient**	**NAN *t*-Statistics**	**Tobin's *q* Coefficient**	**Tobin's *q* *t*-Statistics**
ln (NAN)			0.1296	1.88*
ln (*q*)	0.3884	2.90***		
Debt Ratio	-0.0810	-2.84***	-0.0075	-0.33
Advert Ratio	3.7062	2.33***	3.0977	2.77***
R&D Ratio	1.955	1.94*	-0.6434	-0.88
1/Share Price	-0.5607	-0.69		
ln (Dispersion)			-0.0173	-3.27***
ln (Return Variance)	0.0024	0.65		
ln (Trading Volume)	0.1130	4.38***		
Return to Capital			3.7097	11.79***
ln (Firm Size)	0.0139	0.30	0.0035	0.12
ln (Shareholders)			0.0805	2.67***
SOX	-0.0439	-2.31**	0.0582	3.66***
Adjusted R^2	0.12			

Table 10
Descriptive Statistics of Sample (Essay 3)

Note: The table shows descriptive statistics of the cost of equity capital calculated using the Gordon Growth Model ($R_i = (DIV_{i,t+1} / P_i) + g_i$), debt ratio (long-term debt/common equity), number of security analysts (NAN), the absolute normalized forecast error (ANFE), which is equal to the absolute value of the difference between the consensus forecast EPS and the actual EPS divided by the absolute value of the actual EPS, dispersion (coefficient of variation of the consensus forecasts over the year), return volatility (the standard deviation of the monthly stock returns for each firm over the year), the earnings volatility (Evol), which is equal to the coefficient of variation of annual pre-tax income over the past two years (i.e., the standard deviation of the pre-tax income over the past two years divided by the mean), the book to market ratio (book value of equity/market value of equity), firm size (book value of total assets), and the dummy variable SOX., which is equal to one if the forecast period is within the post-SOX period and zero otherwise. Firms are also put into quartiles depending on their level of total assets. Quartile 1(Q1) represents the smallest firms while quartile 4 (Q4) represents the largest firms. Observations where NAN<2 were dropped from the sample since it would not be possible to calculate the dispersion. The trading volume is reported in thousands of dollars, and the firm size is reported in millions of dollars.

Panel A: All Firms

Variable	Mean	Median	SD
Cost of capital	0.07	0.02	1.66
SOX	0.36	0	0.48
Debt Ratio	0.58	0.46	0.50
Trading Volume	14,896.06	4024.09	40263.92
NAN	12.79	11	8.29
Forecast Error (ANFE)	0.35	0.05	1.87
Dispersion	0.04	0.02	0.65
Earnings Volatility	0.39	0.28	0.54
Return Volatility	1.77	1.09	2.23
BE/ME Ratio	0.44	0.39	0.29
Firm Size	20147.34	3166.70	76968.09

Table 10 cont'd

Panel B: Firms by Size (Quartiles 1 and 2)

Variable	Mean		Median		SD	
	Q1	Q2	Q1	Q2	Q1	Q2
Cost of capital	0.13	0.06	0	0.01	3.27	0.91
SOX	0.24	0.36	0	0	0.43	0.48
Debt Ratio	0.33	0.57	0.14	0.47	0.43	0.47
Trading Volume	987.6	3,745.1	434.3	1,727.3	1,657.3	6,826.9
NAN	5.82	9.19	5	8	3.94	5.51
Forecast Error (ANFE)	0.64	0.33	0.09	0.06	3.09	1.86
Dispersion	0.02	0.06	0.03	0.02	0.53	0.87
Earnings Volatility	0.37	0.42	0.28	0.30	0.62	0.57
Return Volatility	1.09	1.39	0.71	0.97	1.06	1.20
BE/ME Ratio	0.49	0.48	0.41	0.44	0.35	0.29
Firm Size	363.9	1,505.8	350.9	1,385.8	174.3	604.3

Panel C: Firms by Size (Quartiles 3 and 4)

Variable	Mean		Median		SD	
	Q3	Q4	Q3	Q4	Q3	Q4
Cost of capital	0.05	0.05	0.03	0.06	0.52	0.67
SOX	0.38	0.44	0	0	0.48	0.50
Debt Ratio	0.61	0.77	0.49	0.68	0.47	0.51
Trading Volume	12,364.2	39,090.9	6157.3	18,263.9	2,4316.3	6,7395.3
NAN	15.15	19.58	14	19	7.33	7.64
Forecast Error (ANFE)	0.27	0.19	0.04	0.03	1.08	0.82
Dispersion	0.05	0.03	0.02	0.02	0.26	0.77
Earnings Volatility	0.40	0.37	0.29	0.24	0.52	0.46
Return Volatility	1.64	1.75	1.28	1.38	1.27	1.31
BE/ME Ratio	0.39	0.41	0.36	0.37	0.27	0.25
Firm Size	6,028.5	68,380.4	5,526.4	26,715.3	2,483.2	13,8537.8

Table 11

Regression of the Cost of Equity Capital

Note: The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the CRSP, I/B/E/S, and COMPUTSAT databases and have a December fiscal year end. The variables are the cost of equity capital calculated using the Gordon Growth Model ($R_i = (DIV_{i,t+1} / P_i) + g_i$), debt ratio (long-term debt/common equity), number of security analysts (NAN), the absolute normalized forecast error (ANFE), which is equal to the absolute value of the difference between the consensus forecast EPS and the actual EPS divided by the absolute value of the actual EPS, dispersion (coefficient of variation of the consensus forecasts over the year), return volatility (the standard deviation of the monthly stock returns for each firm over the year), the earnings volatility (Evol), which is equal to the coefficient of variation of annual pre-tax income over the past two years (i.e., the standard deviation of the pre-tax income over the past two years divided by the mean), the book to market ratio (book value of equity/market value of equity), firm size (book value of total assets), and the dummy variable SOX., which is equal to one if the forecast period is within the post-SOX period and zero otherwise. Firms are also put into quartiles depending on their level of total assets. Quartile 1(Q1) represents the smallest firms while quartile 4 (Q4) represents the largest firms. Observations where NAN<2 were dropped from the sample since it would not be possible to calculate the dispersion. The trading volume is reported in thousands of dollars, and the firm size is reported in millions of dollars.

*** Denotes statistical significance at the 1% level in two-tailed tests.

** Denotes statistical significance at the 5% level in two-tailed tests.

Variable	**Coefficient**	***t*-Statistics**
SOX	-0.0042	-1.98**
Debt Ratio	-0.0017	-0.76
NAN	-0.0088	-4.38***
Forecast Error (ANFE)	0.0001	0.24
Dispersion	0.0064	7.60***
Earnings Volatility	0.0096	9.05***
Return Volatility	0.0030	2.91***
BE/ME Ratio	0.0051	2.68***
Firm Size	-0.0523	2.04**
Adjusted R^2	0.14	

Table 12
Regression of the Cost of Equity Capital by Firm Size

Note: The sample includes firms in the S&P 500 and S&P 600 indexes, which are included in the CRSP, I/B/E/S, and COMPUTSAT databases and have a December fiscal year end. The variables are the cost of equity capital calculated using the Gordon Growth Model ($R_i = (DIV_{i,t+1} / P_i) + g_i$), debt ratio (long-term debt/common equity), number of security analysts (NAN), the absolute normalized forecast error (ANFE), which is equal to the absolute value of the difference between the consensus forecast EPS and the actual EPS divided by the absolute value of the actual EPS, dispersion (coefficient of variation of the consensus forecasts over the year), return volatility (the standard deviation of the monthly stock returns for each firm over the year), the earnings volatility (Evol), which is equal to the coefficient of variation of annual pre-tax income over the past two years (i.e., the standard deviation of the pre-tax income over the past two years divided by the mean), the book to market ratio (book value of equity/market value of equity), firm size (book value of total assets), and the dummy variable SOX., which is equal to one if the forecast period is within the post-SOX period and zero otherwise. Firms are also put into quartiles depending on their level of total assets. Quartile 1(Q1) represents the smallest firms while quartile 4 (Q4) represents the largest firms. Observations where NAN<2 were dropped from the sample since it would not be possible to calculate the dispersion. The trading volume is reported in thousands of dollars, and the firm size is reported in millions of dollars.
*** Denotes statistical significance at the 1% level in two-tailed tests.
** Denotes statistical significance at the 5% level in two-tailed tests.
* Denotes statistical significance at the 10% level in two-tailed tests.

Panel A: Quartile 1

Variable	**Coefficient**	***t*-Statistics**
SOX	-0.0526	-1.83*
Debt Ratio	0.5241	1.14
NAN	-0.0472	-1.77*
Forecast Error (ANFE)	-0.0056	-0.48
Dispersion	-0.1076	-0.90
Earnings Volatility	0.3186	0.99
Return Volatility	0.2326	1.18
BE/ME Ratio	-1.3945	-0.99
Firm Size	-0.8646	-1.95*
Adjusted R^2	0.13	

Table 12 cont'd

Panel B: Quartile 2

Variable	**Coefficient**	***t*-Statistics**
SOX	-0.2012	-2.56***
Debt Ratio	0.0518	2.35**
NAN	-0.0133	-2.23**
Forecast Error (ANFE)	-0.0014	-0.31
Dispersion	.0160	2.18**
Earnings Volatility	0.0291	0.79
Return Volatility	-0.0045	-0.40
BE/ME Ratio	-0.0144	-0.40
Firm Size	-0.0027	-1.89*
Adjusted R^2	0.17	

Panel C: Quartile 3

Variable	**Coefficient**	***t*-Statistics**
SOX	-0.2223	-4.90***
Debt Ratio	0.0125	2.50***
NAN	-0.0764	-2.12**
Forecast Error (ANFE)	0.0335	2.64***
Dispersion	-0.0004	-0.04
Earnings Volatility	-0.0112	-0.71
Return Volatility	0.0235	1.18
BE/ME Ratio	0.1132	2.03**
Firm Size	-0.0330	-1.86*
Adjusted R^2	0.17	

Table 12 cont'd

Panel D: Quartile 4

Variable	**Coefficient**	***t*-Statistics**
SOX	-0.1127	-2.53***
Debt Ratio	0.0524	1.68*
NAN	-0.0606	-1.84*
Forecast Error (ANFE)	0.0575	5.11***
Dispersion	0.0297	1.80*
Earnings Volatility	0.0075	0.86
Return Volatility	0.0747	1.82*
BE/ME Ratio	0.0438	0.85
Firm Size	-0.0394	-2.15**
Adjusted R^2	0.16	

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