Accounting Choice in Troubled Companies: An Examination of Earnings Management by NASDAQ Firms in Jeopardy of Delisting

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Dissertation submitted to the faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

In
Business Administration
With a Concentration in Accounting & Information Systems

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May 28, 2004
Blacksburg, Virginia

Keywords: Earnings Management, NASDAQ, Delisting, Accounting Choice, Abnormal Accruals

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ABSTRACT

The purpose of this research is to examine whether managers of troubled firms engage in income-increasing earnings management for capital market purposes to maintain a listing on the NASDAQ National Market. Troubled firms are defined as those firms whose share price has fallen below the specified dollar-per-share minimum mandated by the market. The two hypotheses attempt to answer two separate, but interrelated questions: First, do managers of troubled firms engage in earnings management more in periods of distress than in periods of non-distress? And second, do managers of troubled firms engage in earnings management more than similar firms not in jeopardy of delisting? Both a time-series and cross-sectional approach is used to answer these questions.

The initial grouping consisted of all NASDAQ National Market firms with a share price of $1 or below at some point during the period from March 1997 through September 2002. The final sample consisted of 215 firms for the time-series analysis and 495 firms for the cross-sectional analysis. Two accrual expectation models were used, including the Jones (1991) and the modified Jones Model (Dechow, Sloan, and Sweeney, 1995). The results were unable to confirm that managers engage in this behavior, and similar to the results of DeAngelo, DeAngelo, and Skinner (1994), the findings suggest that managers' accounting choices primarily reflect their firms' financial difficulties, rather than attempts to inflate income through discretionary accruals. After controlling for reverse stock splits, dividend reductions, going-concern issues/bankruptcy, and changes in management, the models found significantly negative abnormal accruals. The dissertation concludes with a discussion of possible interpretations for the findings.

DEDICATION

I would like to dedicate this dissertation to the most important people in my life: my parents, Mary Louise and Houston E. Belski, my great-uncle, Houston A. Belski, my best friends and soul mates, Stacey L. Moore, Stephen T. Monti, Brad L. Emberton, and Pooch. Without their continuous love, support, and encouragement throughout this entire process, I couldn't have made it. You are all a constant source of inspiration and reassurance to me. I love you all very much and am blessed to have you in my life.

ACKNOWLEDGEMENTS

The completion of this dissertation represents a true milestone that could not have been accomplished without the assistance of many fine people. I would like to take this opportunity to express my sincere appreciation to all those who have helped me through this life-fulfilling journey.

My sincere gratitude to the members of my dissertation committee, John C. Easterwood, John J. Maher, Raman Kumar, and Fred Richardson for their helpful discussions and valuable insights and suggestions. Special thanks to my Chair, John A. Brozovsky (JB) for his patience, inspiration, and intellectual guidance every step of the way. I am forever grateful to Wayne Leininger and Bob Brown for their invaluable professional advice and motivation throughout my studies in Blacksburg. Thanks for not giving up on me.

I would like to acknowledge the financial support from the KMPG Foundation throughout my five years of graduate study at Virginia Tech with special thanks to Bernie Milano, and the Department of Accounting at University of Miami for funding the CRSP dataset used in the dissertation. I would also like to thank the students participating in the PhD Project Accounting Doctoral Students Association for their moral support and encouragement especially Kelly Ann Richmond, Pam Smith, and Michael McMillan.

I also wish to thank Stephen Monti, Stacey Moore, James Yardley, Anthony J. Amoruso, Mark Friedman, and seminar participants at Xavier University, Suffolk University, Pepperdine University, Providence College, Samford University, the University of Miami, the University of Massachusetts-Boston, Saint Joseph's University, Pace University, Virginia Tech, and the Cornerstone Research Group for constructive suggestions and manuscript review.

Very special thanks to my mentor at the University of Notre Dame, Tom Frecka, for encouraging me to pursue a career in academia.

Lastly, I wish to thank Joseph Beams, Anita, Amanda, and Andy for being my second family in Blacksburg. Thanks for always being there for me.

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Chapter 1: Introduction and Motivation

This research examines whether managers of troubled firms have engaged in accrual based earnings management when capital market incentives to increase firm value are likely to be high. More specifically, this study examines the earnings behavior of firms in jeopardy of delisting from the National Association of Securities Dealers Automated Quotations (NASDAQ) National Market® because they command a share price below the specified dollar-per-share minimum mandated by the market. In this research, I determined whether the managers of these firms, in anticipation of a potential delisting, have practiced earnings management in an attempt to keep their share price at an acceptable level, deferring or avoiding removal from the NASDAQ National Market®.[1]

Maintaining a listing on an established stock market or exchange is considered critical to the long-term success of many firms. Ying, Lewellen, Schlarbaum, and Lease (1977) found that a firm's stock price reacts positively to the listing announcement. Sanger and McConnell (1986) and Grammatikos and Papaioannou (1986a) provide empirical evidence that a listed firm's value is enhanced due to the improved liquidity (via increased

[1] The NASDAQ Stock Market®, NASDAQ National Market®, NASDAQ®, NASDAQ 100 Index®, and OTC Bulletin Board® are registered service/trademarks of The Nasdaq Stock Market, Inc. NASDAQ Trader, and The NASDAQ SmallCap Market are service/trademarks of the NASDAQ Stock Market, Inc. The NASDAQ Stock Market, Inc., and NASD are registered service/trademarks of the National Association of Securities Dealers, Inc.

demand for the security) lent by a major stock market to the participating firm. Grammatikos and Papaioannou (1986b) also report evidence of enhanced firm value but attribute this to managerial signaling. Moreover, the established market provides a company with ready-access to permanent, non-interest bearing capital and enhanced credibility with outside stakeholders, including added visibility and more extensive coverage in the financial press.

In contrast to the benefits of establishing a market listing, significant disadvantages befall firms removed from an exchange. Companies often find that their share prices actually decrease further upon delisting, due to the public's negative perception of a delisted company. Based on a sample of companies that were delisted from the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX), Sanger and Peterson (1990) present evidence that the delisted companies' values were negatively impacted by a magnitude of 8% when their common stocks were delisted from the exchange. Similarly, Shumway (1997) reports a decline in stock price of approximately 14% following performance-related delisting announcements.

The use of earnings management or income smoothing is not new. Its use, however, draws increased media and investor scrutiny in an environment where the market often punishes a company for failing to meet its earnings estimates or forecasts. Considering the advantages of obtaining a listing, and the disadvantages of losing a listing, one might expect a company to do whatever necessary, within the limits of generally accepted accounting principles (GAAP), to present itself in a favorable manner to appease shareholders and to ensure its continued participation on an established exchange. Thus, clear incentives exist for managers to engage in earnings manipulation within the context of allowable accounting procedures.

Current GAAP permit a certain degree of managerial discretion in the application of accounting methods. Using this discretion and flexibility to enhance the perception of the firm is commonly referred to as "earnings management" in the academic and professional literature. Although no universally acceptable definition of earnings management currently exists, Healy and Wahlen (1999) define earnings management as follows: *"Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company, or to influence contractual outcomes that depend on reported accounting numbers."* [2]

Note that the process involves taking deliberate steps within the constraints of GAAP to bring about a desired level of reported earnings. This opportunistic (or managerial opportunism) perspective holds that managers have incentives to use their accounting discretion to distort reported financial information by making biased estimates and assumptions in order to maximize their own utility. Other authors qualify that the intent might not be to deceive, but rather to increase the overall value relevance of accounting earnings by using the discretionary accrual component of earnings to reveal managers' private information (or assessment of permanent earnings) about the future performance of the firm [Chaney, Jeter, and Lewis (1998); Subramanyam (1996); Holtausen and Leftwich (1983)]. This is often referred to as the information (or efficient contracting) perspective. Moreover, others purport that unmanaged earnings are not

[2] Schipper (1989) defines earnings management as "...a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain (as opposed to, say, merely facilitating the neutral operation of the process)...". Beneish (2001) presents three separate definitions of earnings management in the research literature. He claims the lack of consensus to one definition of earnings management "leads to differing interpretations of empirical evidence in studies that seek to detect earnings management or to provide evidence of earnings management incentives." Another variation of earnings management referred to as income smoothing is defined as "the deliberate dampening of fluctuations about some level of earnings which is considered to be normal for the firm" [Barnea, Ronen, and Sadan (1976); Albrecht and Richardson (1990)].

always in the best interest of shareholders because "both the level and pattern of earnings can convey information." (Ayra, Clover, and Sunder, 2002).

The definition of earnings management provided by Healy and Wahlen (1999) describes both accounting and non-accounting techniques that can be used to manipulate earnings. This is an important distinction. The accounting techniques might include modifying accounting methods or the application of GAAP, changing accounting estimates, and altering the timing of recognition issues, whereas non-accounting issues might include the performance or non-performance of economic transactions. Examples include the timing of asset acquisitions and dispositions, investments in research and development, advertising, and maintenance expenses.

Because the financial press so often confuses the two, one must distinguish between earnings management and the more severe form of earnings management, more appropriately referred to as financial fraud. According to the National Association of Certified Fraud Examiners, financial fraud refers to "intentional, deliberate misstatement or omission of material facts, or accounting data, which is misleading and, when considered with all the information available, would cause the reader to change or alter his or her judgment decision." [3] The precise focus of the present study is firms that employ earnings management within the boundaries of GAAP; as such I am not attempting to examine firms that engage in financial fraud.

The financial press and other regulators have expressed a growing concern on the deterioration of firms' relative quality of earnings [Levitt (1998); Loomis (1999)]. Moreover, growing anecdotal evidence appears to support the argument that earnings management has become pervasive among U.S. firms. In his 1998 speech, "The Numbers

[3] See the *National Association of Certified Fraud Examiners* website at *www.cfenet.com/home.asp*

Game," former SEC Chairman, Arthur Levitt, Jr., argued, "the motivation to meet Wall Street expectations might be overriding commonsense business practices." He further warned that misleading earnings-managed financial reports could eventually hurt investor confidence in the U.S. stock market:

> Today, America's capital markets are the envy of the world. Our efficiency, liquidity and resiliency stand second to none. Our position, no doubt, has benefited from the opportunity and potential of the global economy. At the same time, however, this increasing interconnectedness has made us more susceptible to economic and financial weakness half a world away.
>
> The significance of transparent, timely and reliable financial statements and its importance to investor protection has never been more apparent. The current financial situations in Asia and Russia are stark examples of this new reality. These markets are learning a painful lesson taught many times before: investors panic as a result of unexpected or unquantifiable bad news.
>
> If a company fails to provide meaningful disclosure to investors about where it has been, where it is and where it is going, a damaging pattern ensues. The bond between shareholders and the company is shaken; investors grow anxious; prices fluctuate for no discernible reasons; and the trust that is the bedrock of our capital markets is severely tested (Levitt, 1998).

Levitt goes on to voice serious concerns over earnings management and its ultimate impact on resource allocation, noting management abuses (or "gimmicks") of "big bath" restructuring charges, "cookie jar" reserves, and premature recognition of revenue. Levitt concludes, "What's at stake is nothing less than the credibility of the U.S. financial-reporting system traditionally thought to be the best in the world" (Loomis, 1999). In an effort to crack down on the firms that engage in the management of earnings, the SEC has formed an earnings management task force.

A firm's choice of accounting methods is significant when those selections can affect the timing of revenue and expense recognition. For example, in times of rising prices, the FIFO (first-in-first-out) inventory costing method provides a lower cost of goods sold, and thus a higher gross profit than that of LIFO (last-in-first-out). Choices that advance the recognition of revenues and that delay recognition of expenses increase

reported income, potentially affecting the financial market's valuation of a firm. In addition to manipulating an accounting method, a firm maintains a high degree of discretion in the application of accounting principles. Examples include determining uncollectible rates on accounts receivable or salvage values and useful lives of property, plant and equipment or intangible assets. Finally, a firm also employs discretion over when and how events are disclosed in the financial statements, as well as the timing of economic events such as asset acquisitions and dispositions. For example, a firm can expedite or postpone shipments of merchandise to customers at the end of a period to affect the timing of revenues or classify a probable or near certain contingent liability as remote.

In the present research, I examined the firm's use of accrual-based earnings management because these changes are less likely to attract the attention of regulators and investors. Even if such manipulations are suspected, the information required to undo these changes is often limited or obscure, making it very difficult to adjust for their effect (Schipper, 1989). Moreover, *Accounting Principles Board Opinion No. 20* requires that any change in accounting methods be disclosed in the financial statements. These disclosures make potential benefits derived from changes in accounting methods more visible to investors and analysts alike, removing some of the advantage of the manipulation. The most effective way to manipulate reported earnings in an inconspicuous or difficult-to-detect manner is to alter those accounting policies relating to accruals.

A number of papers that utilize specific subsets of financially troubled firms have examined how managers use accounting discretion to manage earnings (with each paper positing a different definition of *troubled firm*). The results of these studies have been mixed. Several studies have found firms engage in income-increasing accounting choices

[Petroni (1992); Moyer (1990); Sweeney (1994); DeFond and Jiambalvo (1994)]. Other studies have found that firms made income-decreasing accruals or estimates [Jones (1991); Watts and Zimmerman (1978)]. Finally, several other studies have found little or no evidence of earnings management [Liberty and Zimmerman (1986); DeAngelo, DeAngelo, and Skinner (1994); Holthausen (1981)]. These studies are described in more detail in Chapter 2. The research has not yet reached definitive conclusions about earnings management as it relates to troubled firms.

The dissertation is organized as follows. The next chapter outlines the rules governing the NASDAQ National Market listing requirements, for both initial and continued listings, and charts the process the NASDAQ takes before delisting a firm. The stream of literature on earnings management is investigated as well, with special attention focused on studies examining the earnings behavior of 'troubled firms." Chapter 3 develops and refines the research hypothesis. Chapter 4 describes the research design and the empirical methodology and examines the sample and relevant data sources. Chapter 5 shows the empirical results with related analysis. Finally, Chapter 6 provides a review of this study's expected contributions and limitations.

Chapter 2: NASDAQ Listing Issues and Literature Review

The discussion in this chapter begins with a review of the NASDAQ delisting policies and procedures. Next, the literature is reviewed from various perspectives.[4] A number of articles on earnings management are examined here to gain insight into the motivation for such behavior and the variables used to test for its presence. Finally, a number of articles are reviewed that examine the accounting choices of "troubled firms" in order to gain a better understanding of how firms behave in periods of financial distress.

2.1 NASDAQ Delisting Policies and Procedures

The NASDAQ Stock Market is comprised of the NASDAQ National Market® and the NASDAQ SmallCap Market℠. Each market has its own unique set of financial requirements that a company must meet in order to have its securities listed. Firms that choose to list their securities on the NASDAQ National Market® must meet minimum initial and continued inclusion requirements (*2002 NASDAQ National Market® Listing Requirements*). Due to intense competition for firm listings within the NASDAQ and

[4] For comprehensive reviews of the earnings management literature, see Healy and Wahlen (1999) for a review of the academic evidence on earnings management and its implications for accounting standard setters and regulators; Dechow and Skinner (2000) for a reconciliation of the views of earnings management from accounting academics, practitioners, and regulators; and Beneish (2001) for an alternative perspective on earnings management.

competing exchanges, NYSE and AMEX, the NASDAQ upholds these regulatory requirements to maintain the reputation and credibility of the exchange.

Delisting is a multifarious issue, one that does not lend itself to easy, straightforward categorization. A company can be delisted for any number of quantitative or qualitative reasons as established by NASDAQ. Firms might choose to be voluntarily delisted for a number of reasons, including going-private transactions, business combinations, listing on NYSE or AMEX, or by company request. Many troubled companies, however, are involuntarily delisted due to noncompliance with NASDAQ's continued listing requirements. These minimal listing standards include financial conformity with minimum levels of such items as net tangible assets, market capitalization, total assets, total revenue, public float shares and market value minimums, minimum share trading price, number of shareholders (round lot holders), number of market makers, and corporate governance issues (NASDAQ Listing Requirements and Fees, 2001).[5]

NASD Rules 4310(c)(4) and 4450(a)(5) disqualify a company for continued inclusion on the NASDAQ Stock Market if its share price falls below a minimum bid price-per-share for 30 consecutive business days.[6] Table 1 on the following page reports the numbers of NASDAQ regulatory non-compliance delistings from 1996-2002.

[5] For a list of NASDAQ's corporate governance requirements, see Marketplace rules 4350 and 4351 or the "Legal and Compliance" website on www.NASDAQ.com regarding recent changes to NASDAQ's corporate governance policies.
[6] Effective June 29, 2001, the SEC amended the listing requirements for The NASDAQ National Market. Under the prior rules, issuers seeking to qualify for The NASDAQ National Market pursuant to the market capitalization alternative were required to demonstrate a $5 bid price for both initial and continued inclusion. The new rules adjust the continued inclusion standard, applicable to NASDAQ National Market companies qualifying under the market capitalization standard, from $5 to $3. This change harmonizes the standard with other standards by providing a differential between the initial inclusion and continued inclusion requirements. Therefore, the minimum price-per-share might be $1, $3 or $5 (prior to change) if the firm is using an alternative-listing standard for continued listing. See NASDAQ Listing Requirements and Fees, 2002.

Table 1
NASDAQ Delisting Statistics from 1996-2002
Regulatory non-compliance delistings include firms delisted for the following: bid price below minimum, insufficient capital and surplus, public interest concerns, delinquent in required filings and other corporate governance issues, net tangible assets below minimum, violation of reverse merger requirement, market value of public float below minimum, bankruptcy, market capitalization below minimum, net income below minimum, insufficient number of market makers, revenue below minimum, and total assets below minimum.

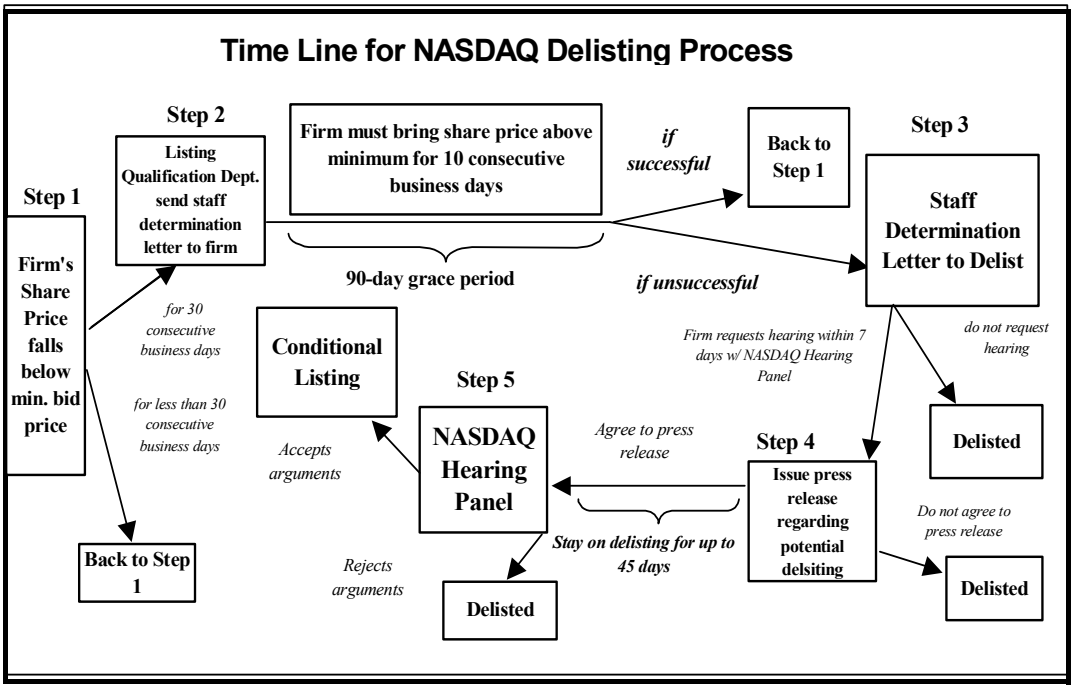
Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Regulatory Non-Compliance Delistings	200	250	596	440	240	390	280

The NASDAQ Listing Qualifications Department sends the troubled firm a Staff Determination letter when the company fails to keep its minimum share price for 30 consecutive business days, even though it might meet the other financial requirements.[7] This Staff Determination letter informs the company that it will be removed from the NASDAQ National Market if it is not successful at raising its share price above the minimum bid price listing requirement for 10 consecutive business days over the next 90 calendar days.

A troubled firm can employ a number of strategies to maintain its listing with NASDAQ. First, based on its particular circumstances, a firm might seek a time extension

[7] On Thursday, September 27, 2001, the NASDAQ Stock Market suspended its rules to allow companies with share prices of less than $1 to remain listed. This suspension was approved through January 2, 2002. At this date, some 670 NASDAQ companies, or approximately 15% of NASDAQ's list, were trading below the $1 level. This relief was granted in response to extraordinary market conditions following the tragedy of September 11 to allow companies to focus on running their businesses, rather than focusing on their listing requirements. After January 2, 2002, firms were again required to adhere to the previously ratified NASDAQ listing requirements. On December 12, 2001, the NASDAQ Stock Market announced its intent to reinstate the requirements for minimum bid prices and market values of public float for companies listed on the NASDAQ National Market ® and the NASDAQ SmallCap Market SM, but intended to change the listing requirements for the SmallCap Market SM companies by extending the grace period to 180 days (from the previous 90 day grace period). On January 20, 2003, the NASDAQ Stock Market announced a proposal to allow issuers that meet heightened financial requirements to benefit from extended compliance periods for satisfying minimum bid price requirements. This proposal extends the bid grace period for all NASDAQ Markets issuers (including the NASDAQ National Market) to 180 calendar days. An additional grace period of 180 calendar days' (540 days for SmallCap SM companies) is provided to firms that comply with core National Market initial listing criteria. The proposal has since been ratified. For more information, please see the review of the November 2003 Regulatory Requirements of The NASDAQ Stock Market.

from NASDAQ to raise its share price to an acceptable level, or it might attempt to seek some form of an exception or exemption to the share price rule. The NASDAQ Stock Market reserves sole discretion to grant extensions or exemptions. Second, a company might appeal the Staff Determination letter within seven days of receipt and request a hearing before the NASDAQ's Listing Qualifications Panel. The hearing will be scheduled within 45 days of the request. This request stays the effect of the Staff Determination letter, pending the Panel Decision. If the decision of the Staff Determination letter is upheld at this hearing, the company can seek an additional review within 15 days of the Panel Decision to the NASDAQ Listing Hearing and Review Council. The stay on the 90-day period for complying with per share bid price minimums is suspended when seeking



review at this level. Figure 1 below depicts the typical NASDAQ delisting process.

Fig.1. Illustration of NASDAQ delisting process. Information from The NASDAQ Stock Market: Regulatory Requirements, 2001.

If the decision to delist is upheld, the troubled firm has one final option before delisting. Under Rule 19 of the Securities Exchange Act of 1934, the firm can request the Securities Exchange Commission (SEC) to review the NASDAQ delisting decision. In addition to the extension/exemption and appeal options, a troubled company might undertake corrective measures to ensure its continued status as a NASDAQ-listed firm. The goal of such measures is to raise the firm's share price to at least the minimum bid price for 10 consecutive business days over the 90-day compliance period.

Two possible methods that might cosmetically increase the company's share price include a share repurchase or a reverse stock split. Both methods reduce the number of shares outstanding, which should correspondingly lead to a higher stock price. A share repurchase is not often a viable alternative because most companies with share price problems do not have the excess cash or financial slack to repurchase shares, leaving the reverse stock split as a last resort. A reverse stock split, in contrast to a regular stock split, substitutes one new share for multiple (old) outstanding shares. The intent is to drive down the number of outstanding shares resulting in an increase in both the par value and trading value on each remaining outstanding share.[8] Once the bid falls below the market minimum, there typically isn't enough time to complete a reverse split, which can take three to four months. Moreover, a reverse split requires a proxy statement, SEC approval, and in many cases the approval of the majority of all shareholders – not just those shareholders who vote. The process of getting over 50% of the shareholders to approve the measure is a difficult and time-consuming task.[9] Anecdotal evidence supports the theory that managers use reverse stock splits to maintain compliance with stock exchange

[8] Additionally, the reverse stock split has the added benefit of increasing a company's earnings per share, thereby giving the perception that the company's earnings are greater after the reverse split even though the new EPS figure is based on a higher market value.

[9] Another important consideration relates to how many shares of stock a troubled company has outstanding. If after the reverse split there were fewer than 750,000 to 1.1 million of publicly held shares (total shares outstanding less any shares held by officers, directors, or beneficial owners of 10% or more), the company would be in violation of marketplace rules 4450(a) or 4450 (b) and face the same delisting process.

requirements.[10] In theory, a reverse stock split is merely an accounting change, leaving investors no better or worse off than they were before the split. The investment community, however, is less impressed by such measures.[11] Many view this as management intimating (or signaling) their lack of confidence that the stock price will improve in the future on its own. [12]Additionally, the empirical evidence on reverse stock splits supports a negative market reaction to such an announcement [Spudeck and Moyer (1985); Peterson and Peterson (1992); and Desai and Jain (1997)].[13]

When a company is removed from the NASDAQ National Market, the delisting does not automatically force a public company out of business, but delisting does impair its ability to compete for financing. The company's shares do not cease trading, but the company's shares are relegated to the SmallCap Market[14] or the decentralized Over-the-Counter Bulletin Board (OTCBB), if they are current in their periodic reports.[15] Otherwise,

[10] Matt Krantz and Gary Strauss (USA Today, February 14, 2001, Section B) report that, "….reverse stock splits are increasingly being used by troubled companies trying to remain listed on U.S. stock markets."
[11] Brian Stack (USA Today, February 14, 2001) of MFS New Discovery fund states, "Depending on how you view [reverse stock splits], it's amusing or pathetic. I suppose at a cosmetic level, it's an easy way to restore predictability. But the market is smarter than that. Over time, a company's fundamentals are going to dictate its stock price."
[12] Using a sample of Canadian firms that undertake a reverse stock split, Masse, Hanrahan, and Kushner (1997) find support for the hypothesis that reverse stock splits are a positive rather than a negative signal.
[13] According to Prem Jain, Professor of Accounting at Georgetown University (USA Today, February 14, 2001), "….shares of the 76 firms that did reverse stock splits from 1976 to 1991 fell 10% relative to the market the first year after the split and more than a quarter of these firms were gone or delisted in less than three years."
[14] According to NASDAQ rules, a National Market company that falls below the continued listing requirements is considered for listing on the SmallCap Market provided it demonstrates the ability to meet and sustain compliance with all of the SmallCap maintenance criteria. Additionally, it must file an application for listing on the SmallCap Market and pay the initial listing fees. If a National Market issuer phases down to the SmallCap Market pursuant to the bid price exemption – that is, at the expiration of the 90-day National Market grace period for bid price-- it will be afforded any time remaining under the applicable SmallCap grace period to regain compliance with the bid price requirement. Former National Market issuers that demonstrate compliance with the $1 bid-price requirement for 30 consecutive trading days prior to the expiration of all SmallCap grace periods, as well as compliance with all National Market maintenance requirements (with the exception of bid price) at all times following their phase-down to SmallCap, would be eligible to phase-up to the National Market pursuant to the maintenance criteria.
[15] The OTC Bulletin Board® (OTCBB) is a regulated quotation service that displays real-time quotes, last-sale prices, and volume information in over-the-counter (OTC) equity securities. An OTC equity security generally is any equity that is not listed or traded on NASDAQ® or a national securities exchange. OTCBB securities include national, regional, and foreign equity issues, warrants, units, American Depositary Receipts (ADRs), and Direct Participation Programs (DPPs). The OTCBB is not an issuer listing service, market or exchange. Although the OTCBB does not have any specific listing requirements per se, to be eligible for quotation on the OTCBB, issuers must maintain the OTCBB eligibility rule, which is to remain current in their filings with the SEC or applicable regulatory authority. In 2003, the OTC Bulletin Board® (OTCBB) was phased out, and replaced by a new, higher quality market, the BBXSM (Bulletin Board Exchange[SM]) (see *OTC Bulletin Board Eligibility Rule SEC Adopting Release 34-40878*).

they might be quoted on the Pink Sheets.[16] While stocks can trade on the OTCBB or Pink Sheets as they do on an established exchange, the market is severely restricted and the amount of company information available to investors is greatly diminished.

Consequently, these stocks listed on the OTCBB or Pink Sheets are of little to no interest to institutional investors. The delistings usually lead to a reduced trading volume, reduced liquidity for the shareholder, and as mentioned previously, often decreased firm value.

2.2 Earnings Management Literature

Researchers have examined a variety of managerial incentives to exercise accounting discretion to achieve certain objectives including, capital market considerations, management compensation contracts and debt covenants based on accounting numbers, corporate control contests, and other tax, regulatory, and shareholder considerations. DeFond and Park (1997) present evidence suggesting managers "borrow" earnings from the future for use in the current period when current earnings are "poor" and expected future earnings are "good." Conversely, when current earnings are "good" and expected future earnings are "poor," managers "save" current earnings for possible use in the future.

A strong motivation for managers' accounting choice comes from the fact that their compensation and job security may be tied to the accounting profits.

[16] The Pink Sheets is a quotation service, which is not operated by the NASD or any of its subsidiaries. The Pink Sheets does not have a requirement that companies register with the SEC or remain current in their periodic filings. Today Pink Sheets provides broker/dealers, issuers and investors with electronic and print products and information services designed to improve the transparency of the OTC markets. Pink Sheets is a source of competitive market maker quotations, historical prices and corporate information about OTC issues and issuers. For more detailed discussion of what Pink Sheets offers the OTC market participants see www.pinksheets.com

Healy's (1985) study of managerial accounting decisions postulates that those executives who are rewarded with earnings-based bonuses choose accounting procedures that increase their remuneration. Similarly, Holthausen (1990) notes that managers might engage in opportunistic behavior to maximize their personal wealth through performance-based cash bonuses or enhancement of share price when managers hold stock or stock options.

Earnings management might also result when managers attempt to reduce the potential costs associated with political action. These managers might voluntarily reduce earnings to avoid political scrutiny and increased regulation [Sutton (1988); Wong (1988); Cahan (1992); and Han and Wang, (1998)].

Studies are beginning to call into question the view that investors "see through" earnings management in all cases. Dechow, Sloan, and Sweeney (1996) examine a sample of firms that reported earnings so aggressively that the firms' reporting was challenged by the SEC. The stock market initially valued these firms' earnings normally, and only recognized that their reporting had been aggressive when the SEC pointed out the overstatements. One can infer the market did not have the timely information to estimate discretionary accruals and their impact on company earnings with any precision. This evidence is consistent with other recent findings that the information in financial statements is not fully reflected in stock prices (e.g., Sloan 1996; Ou and Penman 1989; Beneish 1997).

Using a sample of firms from 1971-2000 that restated annual earnings, Richardson, Tuna, and Wu (2003) studied the usefulness of accounting information in predicting earnings management. Consistent with capital market pressures acting as a motivating factor for companies to adopt aggressive accounting policies, they found that

the primary motivation for earnings management behavior is the desire to attract external financing at a lower cost.

By measuring future abnormal returns from a trading rule that is based on the magnitude of earnings management, Chambers (2002) discovered evidence of misallocation of invested capital due to significant mis-pricing caused by opportunistic earnings management. Ahmed, Nainar, and Zhou (2001) report that analysts are typically unable to distinguish between discretionary and non-discretionary accruals. That is, analysts appear to fixate solely on earnings. The findings of these and other studies support the view that investors do not see through even the most aggressive forms of earnings management. For example, Teoh, Welch, and Wong (1998a, 1998b) provide evidence that issuers of initial public offerings (IPOs) and seasoned equity offerings (SEOs) with unusually positive accruals in the year of issuance will experience abnormally poor stock performance in years thereafter.

Other evidence (e.g., DeAngelo, 1986, 1990) indicates the importance of recent accounting earnings in appraising the price of a firm's stock. The DeAngelo (1986) study examined companies whose managers' proposed going private by purchasing all of the publicly held common shares. Despite evaluations of the offer by independent investment bankers, public stockholders often sue, claiming their compensation is inadequate. Shareholders contend that management has understated the reported income upon which that compensation is based and such understatements "devalue" the firm. Erickson and Wang (1999) investigated manipulation of accounting earnings in the period preceding announcement and completion of stock-for-stock mergers in a sample of acquiring firms. Results indicate that in the quarters prior to a merger, acquiring firms tend to manage earnings upward. This result is consistent with the conclusion that acquiring firms use

accounting procedures in an attempt to increase their stock price prior to stock-for-stock mergers.

The widespread use of accounting information in the valuation of stocks can create an incentive for managers to manipulate earnings in order to influence short-term stock price performance. Analytical models developed by Dye (1988) and Trueman and Titman (1988) demonstrate examples of contracting frictions that can lead to earnings management intended to influence the decisions of external capital providers. Moreover, prior research has documented a relation between earnings and stock prices (e.g., Ball and Brown, 1968; Foster, 1977; and Beaver et al., 1979). That is, earnings information is quickly reflected in stock prices. Sloan (1996) has found that investors fixate on earnings and fail to incorporate fully the information contained in the accrual and cash flow components of current earnings until the respective information impacts future earnings. Using quarterly data on a group of Internet stocks, Hand (2000) found that accounting data are "highly value relevant in a simple non-linear manner." Moreover, Hand (2003) notes that economic fundamentals (current book value, forecasted one-year forward earnings, and forecasted long-run earnings growth) dominate in explaining the cross-sectional variation in Net stock prices. Using a large group of New Economy firms (high technology, young firms, and young firms with losses), similar results are demonstrated by Core, Guay, and Buskirk (2003). That is, traditional equity value drivers remain applicable to New Economy periods. These findings when taken together indicate that earnings remain a key component in assessing the value of a firm.

2.3 Earnings Management by Troubled Firms

A relatively large literature base examines the actions of firms in times of financial distress. [17] The papers attempt to examine how firms use accounting choices to affect earnings and cash flows. Using a sample of property-casualty insurance companies operating in the United States and consistent with income increasing accruals, Petroni (1992) found that managers of financially weak insurers bias their claim loss reserves estimates downward in contrast to their financially stronger counterparts. Moyer (1990) examined the accounting choices of managers in commercial banks as they relate to capital adequacy ratio regulations. The results imply that managers in jeopardy of not attaining regulatory minima engage in ratio-increasing accounting adjustments as the primary adequacy ratio declines. A number of researchers examine the accounting decision of managers to meet certain contractual obligations in their debt covenants. For example, Sweeney (1994) indicates that troubled firms that default on debt obligations are more likely to resort to opportunistic accrual management in the five years prior to default than are comparable firms over the same period. Moreover, the defaulting firms tend voluntarily to undertake early adoption of new accounting standards that increase reported net income while deferring those that decrease income. Like Sweeney (1994), but using a sample of troubled firms disclosing a debt covenant violation during the period 1985 to 1988, DeFond and Jiambalvo (1994) report significant positive abnormal accruals in the year prior to the covenant violation. The interpretation of these findings purports that managers increase income to avoid default, supporting positive accounting theory, which predicts that firms approaching covenant violation will make income-increasing accounting choices to loosen their debt constraints. Similar to DeFond and Jiambalvo

[17] "Financial distress" here does not correspond to a single comprehensive definition, but instead is defined differently in each research paper. For example, in Sweeney (1994) and DeFond and Jiambalvo (1994), a firm is deemed to be "troubled" or distressed if the firm defaults on debt covenants. In DeAngelo, DeAngelo, and Skinner (1994), a troubled firm is defined as a firm with losses in three of the five years in addition to cutting their dividends.

(1994) but incorporating an additional variable for insider trading, Beneish, Press, and Vargus (2001) found that managers of firms that experience technical default make income increasing accruals when facing higher expected costs of default and this exercise in manipulation is successful in staving-off default. During this period prior to default, managers are then able to sell their equity contingent wealth at higher prices.

The results of Jones' (1991) empirical tests lend further support to the earnings management hypothesis, demonstrating that managers make income-decreasing accruals during import relief investigations by the U.S. International Trade Commission (ITC). Discretionary accruals were more income decreasing during the year the ITC completed its investigation than would otherwise be expected. Confining their investigation to the provision of bad debts, McNichols and Wilson (1988) provide evidence that firms with extreme reports of income (both positive and negative) choose income decreasing accruals, while firms operating in between these extremes resort to income increasing accruals via negative discretionary accruals of the provision for bad debts.

Liberty and Zimmerman (1986) test the hypothesis that managers in labor union contract negotiations reduce "negotiation period earnings." The findings did not support the view that managers dampen earnings during contract talks.[18] Using a sample of financially troubled NYSE firms with at least three years of persistent losses and dividend reductions, DeAngelo, DeAngelo, and Skinner (1994) found that, after controlling for the influence of declining sales and cash flows on accruals, managers' accounting choices are not opportunistic but rather reflect the firms' financial troubles. They conclude that CEOs might "take a bath" in order to increase the probability of future earnings. This, of course, makes the assumption that the firm and its CEO will survive to benefit from this action.

[18] In a related study, Mautz and Richardson (1992) examined employer's propensity to manipulate their financial reports via changes in accounting method around the time of labor renegotiations. The results infer an association between conservative accounting practices and wage decreases which raises questions about a unions' ability to detect and adjust for the effects of different accounting methods. The results fail to suggest systematic manipulation of financial reports.

In summary, although scant evidence speaks to the size or recurrence of earnings management for capital market purposes, the research does confirm that some firms manage earnings for stock market reasons and that some of these manipulations are not detected by investors or other interested parties. Moreover, the research indicates that when a firm is experiencing troubles considered to be profound, earnings management might become an important survival strategy, surpassing that which is typically predicted by the competing debt covenant hypothesis. Hence, a careful examination of troubled firms' earnings management behavior is clearly warranted.

2.4 The Present Research

Prior research on earnings management has focused almost exclusively on determining whether such behavior exists and why. The findings indicate that earnings management occurs for a variety of reasons as mentioned above. The research on the incentives and effects of earnings management is evolving.[19] Current accrual-based earnings management research appears to be aimed at (1) bettering the empirical model for examining abnormal accruals, (2) devising alternative measures for selecting firms that engage in earnings management, (3) evaluating the effects of potential changes in the corporate governance and accounting standard setting on the occurrence of earnings management, and (4) examining earnings management using specific accounting accruals, such as bad debt provisions, bank loan loss provisions, and claim loss reserves for property-casualty insurers.

[19] A promising alternative methodology for studying earnings management, introduced by Burgstahler and Dichev (1997) and Degeorge, Patel, and Zeckhauser (1999), investigates discontinuities in the distribution of reporting earnings around the thresholds of zero earnings, last year's earnings, and current year's analysts' expectations. Despite the information gleaned from examining the earnings distributions, the methodology does not specifically address the form and extent of earnings management (Beneish, 2001).

The research reported here bridges the prior and current research in earnings management by providing an examination of earnings management by firms in jeopardy of delisting. It contributes to the field of knowledge in this research domain by utilizing the most current and effective models and methodology in a firm-specific earnings management study. The findings augment previous literature on earnings management around mergers (Erickson and Wang, 1999), equity offerings [Teoh, Welch and Wong (1998a and 1998b); Teoh, Welch and Rao (1998)], import relief investigations [Jones (1991); Cahan (1992)], and management buyouts (DeAngelo, 1986). This research also complements the results found in Chen and Schoderbek (1999) regarding the role of accounting information in security exchange delisting on the AMEX. Moreover, this research contributes to a more sophisticated understanding of the relationship between accounting earnings and firm valuation.

Chapter 3: Research Hypotheses

A discussion regarding the motivation for earnings management in the context of troubled firms and delisting follows based on the literature review in Chapter 2, along with testable implications for the Earnings Management (EM) Hypothesis.[20] Two separate hypotheses are developed in this chapter. The first hypothesis examines the magnitudes of discretionary accruals exercised by the managers of troubled firms over time within the firm, referred to as the time-series approach of detecting earnings management. The second hypothesis, or cross-sectional approach, examines whether these same managers manipulate accruals more than a similar (control) firm that is not in jeopardy of delisting. The two hypotheses attempt to answer two separate, but interrelated questions:

(1) *Do managers of troubled firms engage in earnings management more in periods of distress than in periods of non-distress?*
(2) *Do managers of troubled firms engage in earnings management more than similar firms not in jeopardy of delisting?*

[20] Consistent with previous studies of earnings management and accounting choice, this study assumes that the markets cannot completely and perfectly unravel earnings management.

3.1 Motivation Behind Earnings Management Hypothesis

To date, no specific empirical evidence describes the earnings behavior of firms in jeopardy of delisting, and previous evidence remains inconclusive as to whether the managers of troubled firms make income-increasing accruals, income-decreasing accruals, or do not participate in accrual management. (A number of these studies have been discussed in Chapter 2.) The pressure to maintain a listing on an established stock market or exchange, which improves liquidity (by providing a market for communicating information about the company and stimulating demand for a firm's stock) and secures opportunities for future capital investment, might motivate managers to manage earnings. Moreover, several studies have exhibited evidence that earnings management is a practice that managers of troubled firms use to increase earnings in an attempt keep their jobs or to ease possible intervention by the firm's board of directors and/or shareholders [DeAngelo (1988), Moyer (1990)]. Prior evidence has established that CEOs of financially distressed firms incur large bonus and salary reductions as a result of the poor earnings and/or financial state of the firm (Gilson and Vetsuypens, 1993).

Given that the management of a troubled firm might disappear after delisting from an exchange or established equity market, managers might have incentives to influence short-term stock price performance and maximize current shareholder value, along with their related perquisites. By the time such accruals "unwind," the firm might be delisted or defunct, and the manager might no longer be employed with the company. This might further compel management to participate in this activity.

The optimal timing of earnings management is difficult to establish because managers of troubled firms might have reasons to manage earnings both prior to and after the firm's share price drops below the specified dollar-per-share stock price mandated by

the market. One would expect managers to utilize accrual management when the firm enters a period of listing uncertainty, especially if they have not yet relied upon large-scale accrual management practice in previous periods. Except for deferred tax accruals, accrual manipulations cannot continue at a high magnitude because accounting rules constrain accruals to reverse over time. Thus, the degree of accrual manipulation should decline and/or reverse in future periods.[21]

The incentives to manage accounting earnings upward are clearly quite compelling for the managers of troubled firms, but these managers might actually choose not to manipulate earnings for a number of reasons. Agency theory states that for earnings management to occur, the costs for investors to undo earnings management must exceed the cost of managing earnings (Watts and Zimmerman, 1986). In addition, the practice of earnings management has several boundaries. First, the managers' discretion over the accounting numbers is limited by GAAP and the ability of independent auditors and other information intermediaries to detect earnings management. It should be noted, however, the auditors' power to prevent actions taken within the bounds of GAAP is severely limited. Second, corporate audits required by financial intermediaries such as securities regulators, investment banks, and stock exchanges provide a check on overly aggressive earnings management. Third, the possibility of negative financial press or litigation from investors and regulators might discourage managers from engaging in manipulative accounting activities. Fourth, the management of earnings cannot continue at a large magnitude for an indefinite period. Eventually, these accruals reverse in future periods, which could have a negative impact on the ability of the firm to secure capital or increase the firm's future cost of capital. Using a sample of firms that violated SEC financial

[21] Once the firm has been delisted, one might expect the managers to "unload" the accruals in a manner similar to the "big bath" theory. Managers of delisted companies might "unwind' these accruals after delisting to obtain a fresh start. This example suggests a competing argument for the large decline in firm value after a firm is delisted, against that of the liquidity hypothesis and the managerial signaling hypothesis.

reporting requirements, Dechow, Sloan, and Sweeney (1996) found that violators face a higher cost of capital after revelation of these violations. And fifth, the managers of these troubled firms might face loss of reputation, loss of employment, and even possible criminal liability.[22]

Extant theory predicts that earnings management is most likely to occur when the costs of undoing the earnings management are considered high. Alternatively, the management of the troubled firm might decide that the likelihood of detection is high and revert to reporting results that correspond with their actual financial performance.

3.2 Testable Earnings Management Hypotheses

The examination of earnings management around firm-specific events has recently received a great deal of attention by researchers. The majority of these studies focus on the manipulation of accounting accruals, because managers of troubled firms typically have more discretion over accruals than other components of net income. That is, managers are more likely to overstate earnings by managing accruals because investors cannot completely and perfectly unravel the manipulations. Furthermore, Accounting Principles Board Opinion No. 20 requires that any change in accounting methods be disclosed in the financial statements, thus rendering the potential benefits derived from changes in accounting method more visible to investors and analysts alike, removing much of the

[22] The Sarbanes-Oxley Act of 2002 requires a new level of accountability around reporting a company's financial performance. The Act requires that CEOs and CFOs of publicly held companies: (1) certify the accuracy of financial statements and financial information issued by their companies, (2) certify that "internal controls and procedures for financial reporting" have been designed and are in place, (3) certify that "disclosure controls and procedures" are in place to ensure that all material information relating to the company and its financial condition is made known to them, and (4) report that the controls and procedures for financial reporting and disclosure are effective (or identify material weaknesses). The CEO and CFO must certify financial statements filed with the SEC. The certification must state that the financial statements and disclosures fully comply with provisions of the Securities Exchange Act and that they fairly present, in all material respects, the operations and financial condition of the issuer. Maximum penalties for willful and knowing violations of this section are a fine of not more than $5,000,000 and/or imprisonment for up to 20 years.

advantage of such manipulation. Furthermore, studying abnormal accruals reduces the problems associated with the inability to measure the effect of various accounting choices on earnings (Watts and Zimmerman, 1990). By making income-increasing accruals, managers might "borrow" earnings from the future for use in the current period when current earnings are "poor" (DeFond and Park, 1997). Managers do not enjoy complete discretion over the management of accruals. The ability to use accruals to manage earnings should vary depending on the current economic state of the firm. Thus, before reaching any valid conclusions on the use of accruals for earnings management, one must control for the specific component of accruals that is not discretionary.

If a listing on the NASDAQ National Market is important to a manager of a troubled firm, the manager will use discretionary accruals to increase earnings in an attempt to drive up the firm's stock price during the periods in which its listing on the NASDAQ National Market® is in jeopardy.

Thus, my first formal hypothesis, stated in alternative form, is as follows:

H1: ***The discretionary accruals of troubled NASDAQ National Market firms will be more income increasing in the quarters in which the firm is in jeopardy of delisting due to the continued listing share price requirement, than in the surrounding quarters when the firm is not in jeopardy of delisting.***

This hypothesis will be tested by examining the magnitudes of discretionary accruals over time within the firm. The results of the analysis of this hypothesis will provide evidence as to whether mangers of troubled firms use earnings management to a larger degree in the period(s) surrounding the firms' possible delisting from the NASDAQ.

My second formal hypothesis, stated in alternative form, is as follows:

H2: ***The discretionary accruals of troubled NASDAQ National Market firms will be more income increasing in the quarters in which the firm is in jeopardy of delisting due to the continued listing share price requirement relative to those of other similar firms not in jeopardy of delisting.***

This hypothesis is tested by comparing the discretionary accruals of the sample with that of a control group. Anomalous discretionary accruals could arguably result from some omitted variable other than the NASDAQ delisting problem. Therefore, it is also crucial to examine whether the managers of troubled firms manipulate accruals more than the managers of similar firms that are not in jeopardy of delisting.

Chapter 4: Research Design and Methodology

This chapter outlines the research design and methodology that were used to investigate the hypotheses developed in Chapter 3. The analysis is based on the aggregate accrual-based earnings management models. In section 4.1, the regression framework for analyzing accruals is reviewed along with the balance sheet and cash flow approaches for computing accruals. The evolution of the models is shown with special emphasis devoted to the specific benefits of the modifications made to each successive time-series and cross-sectional expectations model subsequent to the Jones (1991) model. A thorough discussion of the estimation issues related to firm-specific earnings management research is addressed. These include highlighting the importance of (1) the specification of the estimation and event period, (2) the estimation approach and measure of accruals used in the examination, and (3) the use of annual versus quarterly accounting data. The selections of the estimation period and test period of this event study are addressed, as well as the specific statistical models used to test the two hypotheses. Section 4.2 reports on the various data sources and selection criteria used in this research. This includes a review of possible factors that affect the managers' use of discretionary accruals, including management ownership issues, management changes or removals, auditor going-concern opinions/bankruptcy, debt covenant violations, and reductions in the firm's normal dividend policy.

4.1 Earnings Management Models

4.1.1 Regression Framework for Analyzing Accruals

The examination of earnings management around firm-specific events has received a great deal of attention in recent years. Much of this research employs accrual-based measures in tests of the earnings management hypothesis, which requires a model that accurately separates reported accruals into their discretionary and non-discretionary components.[23] Many studies have relied on the estimates of abnormal accruals as confirmation of earnings management, even though a definitive connection between abnormal accruals and earnings management has yet to be fully documented.

As described in previous studies [McNichols and Wilson (1988); Jones (1991); Dechow, Sloan, and Sweeney (1995)], total accounting accruals (TA) are made up of a discretionary (DA) component and a non-discretionary (NDA) component:

$$\mathbf{TA=DA+NDA.}$$

Because discretionary accruals (DA) are unobservable, a proxy for this measure is required. The proxy (DAP) measures DA with a degree of error (η):

$$\mathbf{DAP=DA+\eta,}$$

where η is assumed to represent the effects of omitted variables in the estimation of DA, as well as any idiosyncratic variation or white noise. Conversely, the specification of the proxy for discretionary accruals (DAP) determines η. Following Jones (1991), the non-

[23] The earnings management literature uses the term *discretionary accrual* interchangeably with *abnormal accrual, managed accrual,* and *unexpected accrual*. *Nondiscretionary accrual* is often referred to as *expected accrual, unmanaged accrual,* and *normal accrual* in the literature.

discretionary portion must also be estimated (NDAEST) similar to the estimated discretionary portion of total accruals,

$$\mathbf{DAP=TA-NDAEST,}$$

where NDAEST is an estimate of NDA, thereby specifying η:

$$\mathbf{\eta=NDA-NDAEST.}$$

Following McNichols and Wilson (1988) and McNichols (2002), the accrual-based tests for detecting earnings management can be shown in the following linear framework:

$$\mathbf{DA=\alpha+\beta\ PART+\sum_{k=1}^{K}\gamma_k\ X_k+\varepsilon,}$$

where

DA	=	discretionary accruals (typically deflated by lagged total assets) [24];
PART	=	a dummy variable partitioning the data set into two groups for which earnings management predictions are specified by the researcher;
$\mathbf{X_k}$	=	(for k=1,...,K) other relevant variables influencing discretionary accruals; and
ε	=	an error term that is independently and identically normally distributed.

α reflects the mean discretionary accrual in the first group of observations, while α + β reflects the mean discretionary accrual in the second group of observations. Because discretionary accruals cannot be observed and using the formula for the proxy of discretionary accruals above, the correctly specified model, expressed in terms of the proxy, can be shown as

$$\mathbf{DAP=\alpha+\beta\ PART+\sum_{k=1}^{K}\gamma_k\ X_k+\eta+\varepsilon.}$$

[24] The variables are often deflated by total assets, AST, to reduce the effect of scale bias/heteroscedasticity, or unequal error variances, which often lead to inefficient least squares regression parameter estimates and biased estimates of the variances of those parameters (see Jones, 1991).

The earnings management model typically estimated by the researcher can be simplified into the following equation (see McNichols, 2002):

$$\mathbf{DAP=\phi+\gamma\ PART+\nu,}$$

where

$$\mathbf{\gamma=\beta+\rho\ (PART,\upsilon)\ *\ \sigma_{\eta}/\ \sigma_{PART},}$$

which can further be written as

$$\mathbf{\gamma=\beta+bias.}$$

Based on this simplification, the error term η reflects both the effects of the omitted variables when estimating DA and the idiosyncratic variation or white noise in DAP conditional on DA. Thus, γ must be a biased estimate of β if the variable used to partition the data in the research design is correlated with η. McNichols (2002) concludes that studies avoiding this correlation will more effectively detect the existence of true earnings management.

4.1.2 Approaches for Computing Total Accruals

The two most popular methods for computing total accruals, referred to as the *balance sheet approach* and the *cash flow approach*, have been utilized extensively in the research literature. The balance sheet approach measures accruals as the change in accounts from successive balance sheets and relies on the presumed articulation between changes in working capital balance sheet accounts and accrual components of revenues and expenses on the income statement. This approach has been dominant in the research,

having been the only method available for estimating total accruals prior to *Statement of Financial Accounting Standards (SFAS) No. 95: Statement of Cash Flows* (FASB, 1987).[25]

The balance sheet approach typically computes total accruals, TA, as follows:

$$\mathbf{TA_t = (\Delta CA_t - \Delta CL_t - \Delta Cash_t + \Delta STDEBT_t - DEP_t),}$$

where

$\mathbf{\Delta CA_t}$	=	Change in current assets between time t and time t-1;
$\mathbf{\Delta CL_t}$	=	Change in current liabilities between time t and time t-1;
$\mathbf{\Delta Cash_t}$	=	Change in cash and cash equivalents between time t and time t-1;
$\mathbf{\Delta STDEBT_t}$	=	Change in current maturities of long-term debt and other short term debt included in current liabilities between time t and time t-1; and
$\mathbf{DEP_t}$	=	Depreciation and amortization in time t.

Conversely, the cash flow approach measures accruals directly from the statement of cash flows. If applicable to the data in question, the use of the cash flow approach is less computationally demanding and considered more effective at computing total accruals (Collins and Hribar, 2002).

The cash flow approach computes total accruals, TA, as follows:

$$\mathbf{TA_{jt} = EBXI_{jt} - CFO_{jt}}$$

where

$\mathbf{EBXI_{jt}}$ =	Net income before extraordinary items and discontinued operations for firm j at time t; and
$\mathbf{CFO_{jt}}$=	Operating cash flows taken directly from cash flow statement for firm j at time t.

[25] SFAS No.95 establishes the standards for cash flow reporting. It supersedes APB Opinion No. 19, *Reporting Changes in Financial Position*, and requires a statement of cash flows, in place of a statement of changes in financial position, as part of a full set of financial statements for all business enterprises. Issued November 11, 1987, this Statement requires that a statement of cash flows classify cash receipts and payments as operating, investing, or financing activities and provides definitions of each category. This Statement is effective for annual financial statements for fiscal years ending after July 15, 1988.

Collins and Hribar (2002) examined the impact of measuring accruals using both the balance sheet approach and the cash flow approach. The authors conclude that the use of the balance sheet approach introduces significant measurement error into accrual estimates because the partitioning variable is often correlated with the occurrence of non-operating events such as reclassifications, acquisitions, divestitures, accounting changes, and foreign currency translations. This nonarticulation problem can contaminate the estimation of abnormal accruals and lead to the erroneous conclusion that earnings management exists when no such opportunistic activity actually occurs. The authors advocate the use of the cash flow approach where applicable—except for studies using pre-SFAS No.95 data, where "additional specification tests should be conducted to control for possible errors in accrual measurement" (Collins and Hribar, 2002). This method was used in the analysis of the research data.

4.1.3 History of Aggregate Accruals Models

Despite the well-accepted view in the financial press that pervasive earnings management exists, it has been particularly difficult for researchers to establish this with convincing evidence. This difficulty arises because managers have an informational advantage over academic researchers and investors, and they have incentives to mask the adjustments made to reported income. Because we are unable to observe or measure the earnings management component of accruals, several competing models have been developed to estimate the discretionary component of total accruals. Moreover, given the importance of the expectations model in estimating abnormal accruals, it is crucial to select the model with the most precise estimates of expected accruals. The pros and cons of both time-series and cross-sectional models are discussed in this section. After this the reasoning for the approach utilized in the present research is presented.

4.1.3.1 Time-series Approach to Estimating Abnormal Accruals

The models for detecting accrual-based earnings management have evolved over time. The earliest accrual-based earnings management studies used the time-series approach to estimate abnormal accruals. Healy (1985) used total accruals and DeAngelo (1986) used change in total accruals (each from the estimation period) to proxy for expected nondiscretionary accruals, with an explicit assumption that nondiscretionary accruals were stable over time. If nondiscretionary accruals were to change, however, both models would measure this component with error, leading to inflated standard errors due to the omission of relevant (omitted) variables (Dechow, Sloan, and Sweeney, 1995). These early models gave rise to the more recent accrual-based earnings management studies, which estimate discretionary accruals with a degree of error. Jones (1991) and Cahan (1992) hypothesized nondiscretionary accruals were, in fact, not stable over time and thus developed a model that relaxed this assumption. These new models attempt to estimate the level of nondiscretionary accruals by regressing total accruals on the change in sales and the level of fixed assets to control for changes in the firm's economic environment. Under the Jones model, the expected accruals are measured by:

$$\mathbf{E(TA_{jt}/AST_{jt-1})= \beta_0[1/\ AST_{jt-1}] + \beta_1[\Delta REV_{jt}/AST_{jt-1}] + \beta_2[PPE_{jt}/AST_{jt-1}]}$$

where
$\mathbf{E(TA_{jt})}$ = total expected accruals for firm *j* in period *t*;
$\mathbf{AST_{jt-1}}$ = total lagged assets for firm *j* in period *t-1*;
$\mathbf{\Delta REV_{jt}}$ = change in revenues for firm *j* in period *t* from period *t-1*; and
$\mathbf{PPE_{jt}}$ = gross property, plant, and equipment for firm *j* in period *t*.

The coefficients β_0, β_1, and β_2 are firm-specific parameters that are estimated from the ordinary least squares (OLS) regression below:

$$\mathbf{TA_{jt}/AST_{jt} = b_1[1/\ AST_{jt}] + b_2[\Delta REV_{jt}/\ AST_{jt}] + b_3[PPE_{jt}/AST_{jt}] + \varepsilon_{jt}}$$

where

$\mathbf{TA_{jt}}$ = total actual accruals for firm *j* in period *t*; and

$\boldsymbol{\varepsilon_{jt}}$ = error term for firm *j* in period *t*, a residual term that captures all the impacts on $\mathbf{TA_{jt}}$ other than those from $\mathbf{\Delta REV_{jt}}$ and $\mathbf{PPE_{jt}}$.

The coefficients b_0, b_1, and b_2 are the OLS estimates of β_0, β_1, and β_2, respectively.[26]

In an attempt to refine and improve the original formulation of the Jones (1991) model by controlling for the endogeneity bias, Dechow, Sloan, and Sweeney (1995) added the change in receivables ($\mathbf{\Delta REC_{jt}}$) to the model, relaxing the assumption that discretion is not exercised over revenue in either the estimation period or the event period. This approach uses the standard Jones (1991) model in the estimation period and only adds the adjustment in receivables in the prediction period. The motivation behind the inclusion of this variable relates to the assertion that earnings are easier to manage by exercising discretion over the recognition of revenues on credit sales than on cash sales.

This modified version of the Jones model computes expected accruals as follows:

$$\mathbf{E(TA_{jt}/AST_{jt-1})=\beta_0[1/AST_{jt-1}]+\beta_1[(\Delta REV_{jt} - \Delta REC_{jt})/AST_{jt-1}]+\beta_2[PPE_{jt}/AST_{jt-1}],}$$

where

$\mathbf{\Delta REC_{jt}}$ = change in receivables for firm j in period t from period t-1.

The firm-specific parameter estimates, β_0, β_1, and β_2, are those obtained from the ordinary least squares (OLS) regression using the original Jones model.

[26] When estimating working capital accruals (instead of total accruals), the PPE variable is removed from the estimation.

Dechow, Sloan, and Sweeney (1995) and Guay, Kothari, and Watts (1996) evaluated the alternative time-series based accrual-based models for detecting earnings management (e.g., Healy 1985, DeAngelo 1986, and Jones 1991) and found that each model appeared "well-specified when applied to a random sample of firm years, generated tests of low power for earnings management of economically plausible magnitudes (e.g., one to five percent of total assets), and rejected the null hypothesis of no earnings management at rates exceeding the specified test-levels when applied to samples of firms with extreme financial performance" (Dechow, Sloan, and Sweeney 1995). The authors infer that discretionary accrual estimates are correlated with the level of earnings performance. That is, firms with higher earnings exhibit significantly positive discretionary accruals, whereas firms with lower earnings exhibit significantly negative discretionary accruals. The authors concluded that a modified version of the model (suggested by Dechow, Sloan, and Sweeney) developed by Jones (1991) and Cahan (1992) outperform the other competing models.

In controlling for the endogeneity bias in the Jones (1991) model, however, the modified Jones model introduces a different bias. The modified model unrealistically assumes that all changes in the uncollected credit sales result from earnings management. Moreover, this specific modification is only appropriate during periods when earnings are actually managed in this manner, and because we are unable to observe this, the modification might lead to biased predictions (Jeter and Shivakumar, 1999).

In their examination of the alternative (time-series) accrual-based models for detecting earnings management, Dechow, Sloan, and Sweeney (1995) demonstrate that tests of earnings management exhibit abnormal rejection frequencies when applied to (stratified-random) firms with extreme (cash flows) financial performance. Dechow et al. (1995) assert this is primarily due to "investigating earnings management stimuli that are

correlated with financial performance," suspecting a misclassification of nondiscretionary accruals.[27]

The accrual-based earnings management models discussed thus far have been time-series examinations similar to the Jones (1991) model. An exhaustive review of the literature reveals that the time-series model is generally judged as ineffective (due to the misspecification of the model): it fails to measure accurately the discretionary component of accruals. Due to the numerous methodological limitations of the time-series approach, including the long time-series of data needed to estimate the first-stage regression parameters (see Dechow, Sloan, and Sweeney 1995 and Guay, Kothari, and Watts 1996), the research methodology has shifted toward the use of an alternative cross-sectional approach to estimating abnormal accruals.[28]

4.1.3.2 Cross-sectional Approach to Estimating Abnormal Accruals

In their examination of abnormal accruals and debt covenant violation, DeFond and Jiambalvo (1994) estimated accruals using the cross-sectional version of the Jones (1991) model by matching firms (into estimation portfolios) on year and industry affiliation (two-digit SIC code).[29] For each sample firm, they estimated cross-sectional models using data from firms in their corresponding matched portfolio using the following model:

[27] To remedy this weakness in the model, a number of recent cross-sectional models were developed that attempt to control explicitly for financial performance [Dechow, Sabino, and Sloan 1998; Kothari, Leone, and Wasley 2005; Kasznik 1999; Shivakumar 1996; and Beneish 1997].

[28] Due to differences in their approach to estimating expected accruals, the time-series models and the cross-sectional models provide conceptually different estimates of abnormal accruals. As such, these approaches answer different questions related to the management of earnings. This discussion should not be interpreted as the selection of the "best" method, but rather an introduction of a competing approach to time-series analysis.

[29] Previous research has used the cross-sectional approach by matching on a wide range of firm characteristics, including control firms matched on industry and cash flow (DeFond and Subramanyam, 1998), industry and size (Perry and Williams, 1994), industry and net income (Teoh, Welch, and Wong, 1998a), and median performance of the percentile of firms matched on return on assets (Kasznik, 1999).

$$\mathbf{TA_{ijp}/AST_{ijp-1} = \beta_{ojp}[1/\ AST_{ijp-1}] + \beta_{1jp}[\Delta REV_{ijp}/\ AST_{ijp-1}] + \beta_{2jp}[PPE_{ijp}/AST_{ijp-1}] + \varepsilon_{ijp}}$$

where

$\mathbf{TA_{ijp}}$	=	total accruals for estimation portfolio firm *i* matched with sample firm *j* on industry and size for year *p*;
$\mathbf{AST_{ijp-1}}$	=	total lagged assets for estimation portfolio firm *i* matched with sample firm *j* on industry and size for year *p-1);*
$\mathbf{\Delta REV_{ijp}}$	=	change in revenues for estimation portfolio firm *i* matched with sample firm *j* on industry and size for year *p*;
$\mathbf{PPE_{ijp}}$	=	gross property, plant, and equipment for estimation portfolio firm *i* matched with sample firm *j* on industry and size for year *p*;
$\boldsymbol{\varepsilon_{ijp}}$	=	error term for estimation portfolio firm *i* matched with sample firm *j* on industry and size for year *p*;
i	=	1,....I_j, estimation firm index for the number of firms in the estimation portfolios;
j	=	1,.....n, sample firm index; and
p	=	prediction year.

OLS regression was used to obtain estimates b_{ojp}, b_{1jp}, and b_{2jp} of the parameters β_{ojp}, β_{1jp}, and β_{2jp}, respectively. Similar to its time-series counterpart, the inclusion of the change in receivables (ΔREC_{jp}) variable was added in future examinations of the model (Kothari, Leone, and Wasley 2005; Kasznik 1999).

Similar to the studies of Dechow, Sloan, and Sweeney (1995) and Guay, Kothari, and Watts (1996) that examined the precision of the extant time-series models for detecting earnings management, Jeter and Shivakumar (1999) and Peasnell, Pope, and Young (2000) examined the performance of cross-sectional procedures for estimating the managed component of total and working capital accruals. Both studies investigated the specification and power of the cross-sectional version of the Jones and modified Jones models. Additionally, each paper presents its own alternative version for detecting abnormal accruals. The results of both papers agree that the cross-sectional versions of the

Jones and modified Jones models are well specified for random firms but misspecified for firms with extreme cash flows. [30]

4.1.4 Discussion of Estimation Issues

An event- study methodology was utilized to measure accruals-based earnings management. As discussed in McNichols (2002), three distinct estimation issues pertain in the estimation of discretionary accruals. These include (1) the specification of an estimation and event period, (2) the estimation approach (time-series and/or cross-sectional), and (3) the measure of accruals to use (e.g., working capital accruals, current accruals, etc.). This discussion adds a fourth estimation issue, which concentrates on the debate between the use of annual or quarterly accounting data to measure abnormal accruals.

4.1.4.1 Choosing the Specification of Estimation and Event Period

In time-series examinations, the estimation of discretionary accruals requires the specification of an event (or test) period during which earnings management is hypothesized in response to the stimulus identified by the researcher, and an estimation period in which no systematic earnings management is hypothesized. Accruals in the event period are assumed to consist of both discretionary and nondiscretionary accruals. The estimates of nondiscretionary accruals are computed as forecasts from the linear regression of total accruals on certain explanatory variables (typically the change in revenue and level of property, plant, and equipment) fitted over an estimation period. The discretionary (or abnormal) accruals in the event period equal the difference between the actual accruals and the estimated nondiscretionary accruals. Thus, the parameters of the time-series models are estimated for each firm in the sample using data from periods *prior* to the event period.

[30] Peasnell, Pope, and Young (2000) developed "the margin model," which "disaggregates the change in revenue term into two components at the parameter fitting stage, substituting cash receipts in the current period for revenue in the prior period." Results were marginally better than the standard Jones (1991) model.

In contrast, cross-sectional models make no explicit assumptions about earnings management in the estimation period, but implicitly assume that the model parameters are the same across all firms in the estimation sample. The parameters of these models are estimated for each period and firm in the event sample using accounting data of firms in the same industry for the same time period. Because systematic manipulation might be present in the cross-sectional sample, the discretionary accruals estimated from these models are referred to as "industry-relative" abnormal accruals (Jeter and Shivakumar, 1999).

Unknown incentives might exist for managers to engage in accrual manipulation during both the estimation period and the event period in time-series studies. The assumption that the estimation period contains no earnings management is therefore difficult to rationalize. This lowers the power of the test. Moreover, given that accruals must eventually unwind, it is possible that this unraveling has occurred contemporaneously with current or future incentives to alter accruals, leading to an inference of positive or negative discretionary accruals in the test period, when in fact no such abnormal accruals existed (McNichols, 2002).

4.1.4.2 Choosing the Estimation Approach

The selection of the estimation approach is very important to the design of an accrual-based earnings management study. Both the time-series approach and the cross-sectional approach are similar in their attempt to estimate expected accruals after controlling for changes in a firm's economic environment. The difference between the two approaches lies in the selection of the specific estimation sample used to estimate the parameters of each model.

A clear advantage of the time-series approach is its ability to estimate "actual" abnormal accruals by identifying firm-specific relations between accruals and their determinants. The time-series approach is, however, fraught with a number of problems related to data sufficiency. Securing an adequate sample to estimate firm-specific parameters with any statistical power requires a lengthy series of quarterly or annual financial data.[31] This often causes many firms to be removed from the analysis and thus leads to very small sample sizes. The time-series models might then suffer from both selection bias and survivorship bias.[32] As discussed previously, the time-series approach requires that no systematic earnings management is present in the estimation period, which is unlikely given the incentives of management.

The cross-sectional approach, on the other hand, offers several advantages, including a better control for the effects of changing industry-wide economic conditions on total accruals. The cross-sectional model also allows the coefficients to change across periods, which enables one to avoid the unwarranted assumption that coefficients are stable across periods as required in the time-series model (Kasznik, 1999). Finally, it minimizes survivorship bias and leads to more robust sample sizes. A disadvantage of the cross-sectional approach lies in its inability to compare discretionary accruals within the firm over time. Cross-sectional models are also less likely to capture the effects of mean reversion in accruals, dynamic accruals management strategies, and industry-wide earnings management. Another potential drawback might be securing an adequate control firm or portfolio of similar firms for comparison.

[31] Consistent with Jones (1991), McNichols (2000) reports that a reasonable time-series requires a sample firm to have a minimum of ten years' of accounting data, while DeFond and Jiambalvo (1994) report a minimum of six years of annual data to have adequate degrees of freedom to compute the Z statistic.
[32] A dataset suffers from selection bias when a selection rule other than random sampling determines whether a given observation enters the dataset. Survivorship bias is the tendency for poor performers to drop out while strong performers continue to exist.

4.1.4.3 Choosing the Measure of Accrual to Use

As discussed in *Section 4.1.2*, the selection of the specific measure of accruals is vital in an accrual-based earnings management study. If the data exist, the use of the cash flow approach is more accurate at measuring "actual accruals" than its predecessor, the balance sheet approach (Collins and Hribar, 2000).[33] The use of one or both of these methods is dependent on the selection of the time period and firm-specific event of interest.

Another estimation issue relates to the measurement of specific accrual variables. Many papers (see Teoh, Welch, and Wong 1998a, 1998b, for example) have focused on the use of current accruals (also referred to as working capital accruals) because managers are seen to have more flexibility and control over these accounts. This is because managers support the day-to-day operations of the firm,[34] whereas others have measured both current and non-current accruals (adjustments involving long-term assets) to remain consistent with the research stream. Other research has altered the standard calculations of total and current accruals, melding the model to address the specific issues in the study [Rangan (1998); Peasnell, Pope, and Young (2000); Guenther (1994)]. Choosing the accrual variable of interest is dependent not only on the selection of the time period and firm-specific event of interest, but also on the selection of the specific approach to measuring accruals and the use of annual or quarterly accounting data.

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[33] Collins and Hribar (2002) maintain that the use of the balance sheet approach introduces significant measurement error into accrual estimates because the partitioning variable is often correlated with the occurrence of non-operating events. These errors can ultimately taint the estimation of abnormal accruals and lead to the erroneous conclusion that earnings management exists when no such opportunistic activity actually occurs.

[34] Sloan (1996) asserts that most of the variation in total accounting accruals is driven by the current accruals. Recent research by Richardson, Sloan, Soliman, and Tuna (2002), however, indicates that information in accruals about earnings quality is not limited to the current accruals analyzed by Sloan (1996), but extends to non-current accruals. Richardson et al. (2002) successfully derive a model that decomposes accruals into changes in non-cash working capital, changes in net non-current operating assets, and changes in net financial assets. The evidence also shows that while information in accruals originates almost exclusively from asset accruals, liability accruals play a useful role in helping to isolate earnings-quality information in asset accruals.

4.1.4.4 Choosing Annual or Quarterly Accounting Data

Another estimation issue, not specifically addressed by McNichols (2002), relates to the use of annual or quarterly accounting data in the estimation of abnormal accruals. Most earnings management research to date has been based on annual accounting data [Jones (1991); DeFond and Jiambalvo (1994)]. Due to the advantages of employing quarterly accounting information in the detection of earnings management, however, many recent studies are employing this method, particularly around specific corporate events [Han and Wang (1998); Jeter and Shivakumar (1999); Rangan (1998); Erickson and Wang (1999)]. Quarterly data allow for a more timely assessment and sharper focus on the event under examination, which could be confounded with the use of annual data (Shivakumar, 1996). For example, the managers of a company might have large incentives to make income-increasing accruals in certain quarters, but income-*decreasing* accruals in later quarters, obscuring the expected direction of the accruals in a study using annual data.[35] Additionally, because independent auditors rarely examine interim financial statements, managers might have greater incentives to manage quarterly earnings, given that their estimates and accounting choices are unlikely to be evaluated until the annual audit of the financial statements. The use of annual or quarterly data is highly dependent on the selection of the time period and firm-specific event of interest.

[35] In an examination of earnings management by oil companies during the 1990 Gulf War, Han and Wang (1998) provide an excellent example of the benefits of using quarterly data. Political attention was drawn toward the profitability of oil companies during the third and fourth quarters of 1990 due to higher gasoline and crude oil prices. These pressures, however, were not present in the first two quarters of 1990. Had annual data been used, the abnormal accruals of the second half of 1990 would have gone undetected due to alternative incentives in the first half of 1990. This would likely have confounded the measurement of abnormal income-decreasing accruals in detecting earnings management.

4.1.5 Measuring Earnings Management in Troubled NASDAQ Firms

Similar to Jones (1991), this study uses the event-study method to measure accruals-based earnings management. The event- study proceeds via the following steps: (1) identification of the event of interest and definition of the event window; (2) selection of the sample set of firms to include in the analysis; (3) prediction of a "normal" accrual during the event window in the absence of the event; (4) estimation of the abnormal accrual within the event window, where the abnormal accrual is defined as the difference between the actual and predicted ("normal") accrual; and (5) determination as to whether the abnormal accrual is statistically different from zero.

The event of interest in the present study is the potential delisting of troubled NASDAQ National Market firms whose share price has fallen below the specified dollar-per-share minimum mandated by the market. My selected event window pertains to the specific periods of delisting uncertainty. Most research to date that uses aggregate-based accrual models for detecting earnings management has been based on annual accounting data. Nonetheless, because a quarterly financial statement is likely to provide a more timely and sophisticated basis for examining earnings management behavior than is its counterpart (annual financial information), my empirical tests utilize quarterly financial variables.

I predict that troubled NASDAQ National market firms are most likely to manage earnings upward during the quarter prior to the share price dropping below the market mandated minimum; during the concurrent quarter in which the share price drops below the minimum; and during the quarter subsequent to this decline. The selection of these three specific event periods (quarters) is based on the following rationale.[36] As a

[36] The event-study methodology is used to examine the reaction of investors to positive and negative news (also called

preemptive move, managers of the troubled firm might attempt to employ accrual management techniques prior to the decline in stock price. Thus, an inspection of the *preceding* quarter (as measured by t_{-1}) is warranted. When the imminent threat of delisting becomes patently clear to managers, they are likely to take immediate steps to boost share price. Thus, an inspection of the *concurrent* quarter (as measured by t_0) is warranted. Finally, in a reactive mode, managers might adopt a last-minute survival strategy: making income-increasing accruals to maintain the firm's listing. Thus, an inspection of the *subsequent* quarter (as measured by t_{+1}) is warranted. Figure 2 illustrates my timing convention.

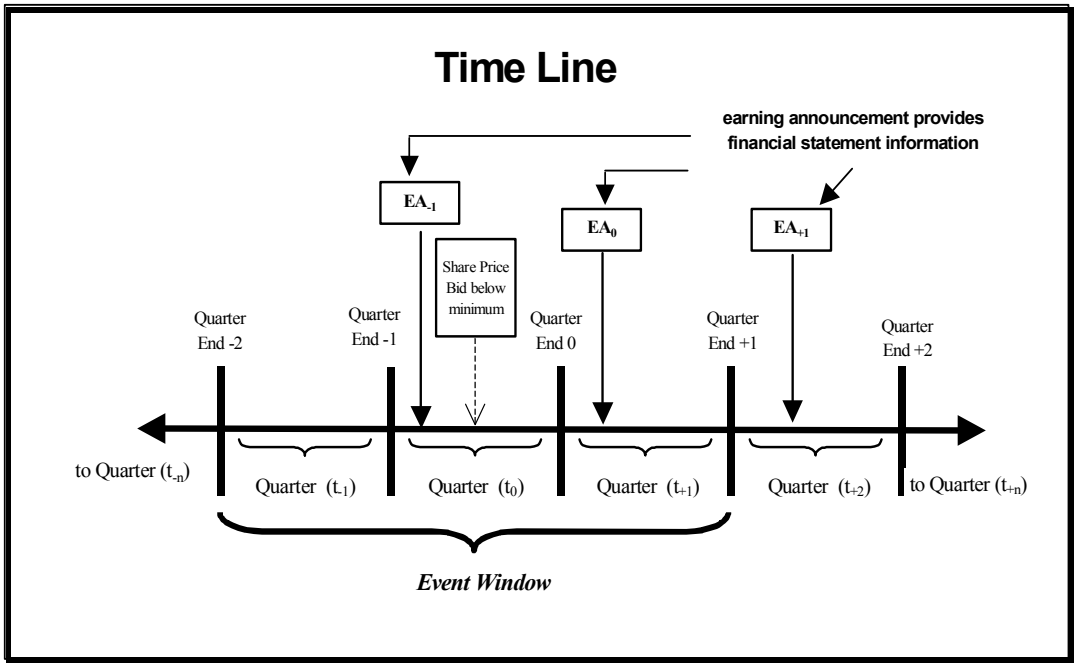

Figure 2. Time Line, EA_{-1} = last earnings-announcement date before firm's share price declined below bid minimum; EA_0 = first earnings-announcement date after firm's share price declined below bid minimum; EA_{+1} = second earnings-announcement date after firm's share price declined below bid minimum.

events). The event window usually consists of the day where the event occurred (day 0) and some days before and after the event. The event-study method can be used to examine longer event periods, but as the estimation window widens, the increasing probability that alternative information (noise) will affect the event measure weakens the power of the tests.

If managers are managing earnings via discretionary accruals as a standard reporting practice, however, one might find that these firms have overextended themselves and might not have "reserves" to manipulate when the firms' listing status becomes endangered. Accrual manipulations cannot continue at a high magnitude because accounting rules constrain accruals to reverse over time. Thus, the degree of accrual manipulation might decline and/or reverse in future periods.[37] Therefore, because it is customary to select an event window larger than the specific period of interest so that the periods surrounding the event can also be inspected, the quarters after quarter +1 (t_{+1}) are also examined separately.

In selecting the sample set of firms to include in the analysis, careful attention has been paid to NASDAQ delisting rules. Most companies listed on NASDAQ National Market [Standard 1 Marketplace Rule 4450(a)] are required to maintain a minimum bid price of $1 per share; however, those National Market companies qualifying for continued listing based on market value of listed securities or total assets and total revenue (Standard 2 Marketplace Rule 4450(b)) are required to maintain, among other criteria, a $5 bid price ($3 after 2001).[38] The NASDAQ does require that the firm maintain one continued listing standard to maintain its listing. Appendix A includes the 2003 (Financial) Requirements for Initial and Continued Listing for the NASDAQ National Market. Based on the capricious nature of the differences between these standards (as they relate to the choice of minimum bid price), the assumption of multiple continued listing standards has been relaxed in favor of the use of the information from Standard 1 Marketplace Rule 4450(a) only. As explained in Chapter 2, a firm is not "officially" in

[37] Firms that become delisted might "unwind' these accruals after being delisted to obtain a fresh start, which might compete with the liquidity hypothesis and the managerial signaling hypothesis for explaining the large decline in firm value. Once the firm has been delisted, one might expect the managers to "unload" the accruals in a manner similar to the "big bath" theory.

[38] NASDAQ does not publicly disclose under which of the three standards [Marketplace Rules 4420(a), 4420(b) or 4420(c)] the firm initially lists its securities.

jeopardy of delisting until its share prices falls below $1 for 30 consecutive business days. This study uses the initial date at which a NASDAQ National Market firm's share price trades at or below $1 in the collection of the sample (without requiring the 30 consecutive business days policy). I have selected this policy because I wanted the sample firms to be in danger of delisting, but I also wanted these firms to have a sufficient opportunity to remedy their situation. A thorough discussion of my selection sample and other relevant selection-related issues is addressed in *Section 4.2.2, Data Selection Criteria*.

Accrual analysis similar to Jones (1991) was performed on the sample of firms for the time period March 1997 through September 2001 (*the choice for this selection is expounded upon in Section 4.2*). Both the times-series approach as presented in Jones (1991) and as modified by Dechow, Sloan, and Sweeney (1996) and the cross-sectional variation of the accrual expectation model used by DeFond and Jiambalvo (1994) were used to estimate "normal" accruals and a variation of the cross-sectional model (as proposed by Kasznik, 1999). Kasznik (1999) includes a third explanatory variable, ΔCFO, because empirical evidence indicates that accruals are negatively correlated with changes in cash flows. This new variable extracts more of the nondiscretionary component out of the model to the extent that the temporary component of cash flow has a nondiscretionary effect on total accruals.

Both the time-series and cross-sectional approaches were employed to answer similar, yet distinct, research questions as to whether troubled firms engage in accrual management. The decision also stems from the distinct benefits and drawbacks each approach supplied for addressing the research issue. As discussed previously, the main advantage of the time-series approach lies in its ability to identify firm-specific relations between accruals and their determinants. The drawback, however, is securing an adequate "estimation" sample, which usually requires a long series of quarterly or annual financial

data, causing many firms to be removed from the analysis. Another deficiency relates to the selection of an estimation period, in which the assumption of no systematic earnings management is hypothesized.[39] The cross-sectional approach offers several advantages, including a better control for the effects of changing industry-wide economic conditions on total accruals. This approach also allows the coefficients to change across periods, avoiding the assumption that coefficients are stable across periods as required in the time-series model. A disadvantage of the cross-sectional approach lies in its inability to compare discretionary accruals within the firm over time. Cross-sectional models are also less likely to capture the effects of mean reversion in accruals, dynamic accruals management strategies, and industry-wide earnings management. Moreover, procuring an adequate control firm or portfolio of similar firms for comparison that is similar in all material respects except for the effect of the firm-specific event might be another potential shortcoming.

In view of the fact that the event window used in this study is post-1988, the cash flow approach, which measures accruals directly from the statement of cash flows, was used in the present study to calculate the "actual" accruals. The cash flow approach has been determined to be more precise at computing total accruals (Collins and Hribar, 2002). The cash flow approach computes total accruals, TA, as follows (with COMPUSTAT data items numbered for quarterly items): [40]

[39] As noted in McNichols (2002), "At best, the estimation period includes the effects of hypothesized earnings management and the estimate of nondiscretionary accruals and the test period includes a normal level of earnings management, lowering the power of the test."

[40] Han and Wang (1998) present an alternative approach for firms adopting SFAS No. 95: working capital from operations is computed from quarterly COMPUSTAT data items as the sum of income before extraordinary items (DATA 76), depreciation and amortization (DATA 77), extraordinary items and discontinued operations (DATA 78), deferred taxes (DATA 79), equity in net loss (earnings) (DATA 80), sales of property, plant, and equipment and sale of investment-loss (gain) (DATA 102), and funds from operations-other (DATA 81). Data items reported on a cumulative basis in COMPUSTAT were adjusted to reflect quarterly value.

$$\mathbf{TA_t = EBXI_t - CFO_t}$$

where
$EBXI_t$ = Net income before extraordinary items and discontinued operations (DATA 76); and
CFO_t =Cash flow from operations (DATA 108).

The use of the balance sheet approach might be necessary, however, if the time-series data pre-date SFAS No. 95 or the quarterly cash flow information is not available from COMPUSTAT. The balance sheet approach typically computes total accruals, TA, as follows (with COMPUSTAT data items numbered for quarterly items):[41]

$$\mathbf{TA_t = (\Delta CA_t - \Delta CL_t - \Delta Cash_t + \Delta STDEBT_t - DEP_t),}$$

where
ΔCA_t = Change in current assets between quarter t and quarter t-1 (DATA 40);
ΔCL_t = Change in current liabilities between quarter t and quarter t-1 (DATA 49);
$\Delta Cash_t$ = Change in cash and cash equivalents between quarter t and quarter t-1 (DATA 36);
$\Delta STDEBT_t$ = Change in current maturities of long-term debt and other short term debt included in current liabilities between quarter t and quarter t-1 (DATA 45); and
DEP_t = Depreciation and amortization in quarter t (DATA 5).

4.1.5.1 Time-Series Tests for Measuring Earnings Management

In the investigation of the first hypothesis, I estimate discretionary accruals using both the standard time-series version of Jones' (1991) accrual expectation model and the modified time-series version of Jones' (as modified by Dechow, Sloan, and Sweeney, 1995) model. Similar to the original specification of the standard Jones (1991) model, the present study applied a two-stage approach to partition total accruals into their discretionary and nondiscretionary components. Total accruals were regressed on the change in revenues and the gross level of property, plant, and equipment. This was done

[41] Again, Han and Wang (1998) present an alternative approach for companies pre-SFAS No. 95: total accruals are computed from COMPUSTAT quarterly data and defined as net income (after extraordinary items and discontinued operations) (DATA 69) minus operating cash flows. Operating cash flows are defined as working capital from operations (funds from operations) (DATA 82) minus the sum of changes in accounts receivable (DATA 37), inventory (DATA 38), and other current assets (DATA 39), plus the sum of changes in accounts payable (DATA 46), income tax payable (DATA 47), and other current liabilities (DATA 48). Change in working capital accounts (e.g., accounts receivable) is the difference between the current amount and the amount in the prior quarter.

for each sample firm by using the longest quarterly time-series of data available immediately prior to the event period (estimation window) in the first stage. The estimated parameters from this regression were then combined with TA, ΔREV, and PPE data from the event period to determine the abnormal component of total accruals in the second stage. The explanatory variables ΔREV and PPE were used to control for the expected components in total accruals in the first stage. The variables controlled for the accrual change that is due to evolving economic conditions, not the portion related to the manipulation of accruals. Working capital accruals are expected to increase with revenues, and depreciation accruals are expected to increase with property, plant, and equipment. Therefore, the coefficient for change in revenues was expected to be positive and the coefficient for property, plant and equipment was expected to be negative.[42]

All time-series data for each of the troubled firms prior to quarter -1 (t_{-1}) were used to estimate the parameters based on the following two models: Model 1a estimated total accruals using the standard time-series Jones (1991) model and Model 1b estimated total accruals using the modified time-series Jones (1991) (by Dechow, Sloan, and Sweeney 1995) model: [43]

[42] The change in revenue was used to control for the economic environment of the firm (although not completely exogeneous), whereas gross property, plant, and equipment was included to control for the portion of total accruals related to nondiscretionary depreciation expense.

[43] Equation (1a) and (1b) are identical. The modified-Jones model uses the standard Jones model in the estimation period and then adds the adjustment in receivables in the prediction period.

$$\mathbf{TA_{jt}/AST_{jt-1} = \beta_{0j}[1/\ AST_{jt-1}] + \beta_{1j}[\Delta REV_{jt}\ /\ AST_{jt-1}] + \beta_{2j}[PPE_{jt}/AST_{jt-1}] + \varepsilon_{jt}} \quad \textbf{(1a)}$$

$$\mathbf{TA_{jt}/AST_{jt-1} = \beta_{0j}\ [1/\ AST_{jt-1}] + \beta_{1j}[\Delta REV_{jt}\ /\ AST_{jt-1}] + \beta_{2j}[PPE_{jt}/AST_{jt-1}] + \varepsilon_{jt}} \quad \textbf{(1b)}$$

where

$\mathbf{TA_{jt}}$	=	total accruals for firm *j* in quarter *t*,
$\mathbf{AST_{jt-1}}$	=	total lagged assets for firm *j* in quarter *t-1,*
$\mathbf{\Delta REV_{jt}}$	=	revenues for firm *j* in quarter *t* less revenues for quarter *t-1*,
$\mathbf{PPE_{jt}}$	=	gross property, plant, and equipment for firm *j* in quarter *t*,
ε_{jt}	=	error term for firm *j* in quarter *t*, a residual term which captures all the impacts on $\mathbf{TA_{jt}}$ other than those from $\mathbf{\Delta REV_{jt}}$ and $\mathbf{PPE_{jt}}$,
j	=	1,….N, firm index,
t	=	1….T_j time period (quarter) index for firm *j*'s estimation period.

Following Jones (1991) and Shivakumar (1996), each estimation sample was required to have a minimum number of observations from the period prior to the event period to estimate the parameters of the time-series models.[44] Jones (1991) required 10 observations in her annual study, whereas Shivakumar required 20 observations in his quarterly (simulation) study.[45] In this study, I required a minimum of 12 observations (3 years of data) to estimate the parameters, but I also tested using 20 observations as in Shivakumar (1996). The statistical tests for the time-series approach require enough degrees of freedom in computing the Z-statistic for significance tests for the "standardized prediction errors." Therefore, all firms lacking sufficient estimation quarters were eliminated from the time-series examination.

[44] The use of a long-time-series of observations improves the estimation efficiency. This, however, also increases the likelihood of structural change occurring during the estimation period, possibly violating the assumption that coefficients are stable across periods

[45] DeFond and Jiambalvo (1994) use a minimum of six years in their annual study. The six years of data were necessary in order to have enough degrees of freedom to compute the Z statistic (discussed previously) for significance tests.

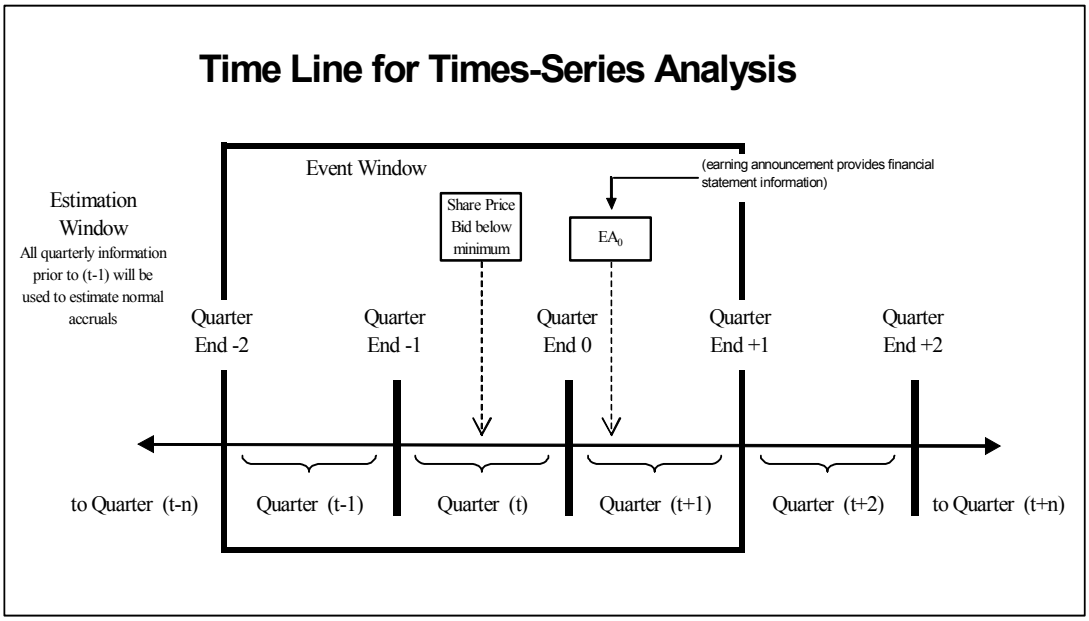

Fig. 3: Time Line for Time-series Analysis

Ordinary least squares regressions were used to obtain estimates b_{oj}, b_{1j}, and b_{2j} of β_{oj}, β_{1j}, and β_{2j}, respectively, from equation (1).[46] The prediction errors or residuals (u_{jp}) represent the unexpected (discretionary) accruals from the estimation of the following models:

$$u_{jp} = TA_{jp}/AST_{jp-1} - (b_{oj}\,[1/AST_{jp-1}] + b_{1j}\,[\Delta REV_{jp}/AST_{jp-1}] + b_{2j}\,[PPE_{jp}/AST_{jp-1}]), \quad (2a)$$

$$u_{jp} = TA_{jp}/AST_{jp-1} - (b_{oj}[1/AST_{jp-1}] + b_{1j}\,[\Delta REV_{jp} - \Delta REC_{jt}/AST_{jp-1}] + b_{2j}\,[PPE_{jp}/AST_{jp-1}]), \quad (2b)$$

where **p** is the quarter for which normal accruals are predicted.

[46] Based on the comments from similar studies (Erickson and Wang, 1999), the use of quarterly data in the earnings management model above will likely give rise to serial correlations in residuals, especially fourth-order autocorrelation, because current quarter data can be expected to be correlated with the data of the corresponding quarter in the previous year. Because autocorrelation in residuals can lead to inefficient parameter estimates and biased standard error estimates if the ordinary least squares method is used, the analyses were also estimated using a maximum likelihood method to correct for the autocorrelation in the residuals.

The prediction errors were calculated for each quarter in which the firm was in jeopardy of being delisted, defined as the quarter preceding, the quarter of, and the quarter following the share price dropping below $1. The results of the time-series analyses are presented in Chapter 5.

4.1.5.2 Cross-Sectional Tests for Measuring Earnings Management

In the investigation of the second hypothesis, discretionary accruals were estimated using several cross-sectional versions of the Jones (1991) model. Similar to the time-series approach, discretionary accruals were estimated using both the cross-sectional version of Jones' (1991) accrual expectation model and the modified cross-sectional version of Jones' (as modified by DSS, 1995) model.

Similar to the cross-sectional specification used by DeFond and Jiambalvo (1994), I used a two-stage approach to partition total accruals into their discretionary and nondiscretionary components. I created an industry-matched control group of non-delisted firms (estimation portfolio) by matching each sample firm with a portfolio of like-firms having the same two-digit SIC code.[47]

The examination began at quarter -1 (t_{-1}) and ran through quarter +1 (t_{+1}). The first stage regression was estimated separately for each industry-quarter combination by regressing accounting accruals on a vector of explanatory variables (ΔREV and PPE data) designed to capture nondiscretionary accruals. The resulting industry- and time-specific parameters from this regression were then combined with TA, ΔREV (-ΔREC), and PPE

[47] DeFond and Jiambalvo (1994) report that the number of firms in their matched portfolios range between 6 and 351 firms. Shivakumar (1995) required 20 observations in the cross-sectional sample for estimating the parameters. Kasznik (1999) excluded industries with portfolios of less than six firms and industries with greater than 300 firms to avoid industry clustering.

data from the event period to determine the abnormal component of total accruals in the second stage.

For each troubled firm, six cross-sectional models were estimated using data from firms in its corresponding matched portfolio. The six models resulted from estimating two cross-sectional models (the cross-sectional version of Jones Model and the cross-sectional version of Modified Jones model) for quarters t_{-1}, t_0, and t_{+1} for total accruals. The following two cross-sectional models were used. Model (3a) and (3b) are identical because the modified-Jones model uses the standard Jones model in the estimation period and then adds the adjustment in receivables in the prediction period.

$$\mathbf{TA_{i,t}/AST_{i,t-1} = \beta_0[1/\ AST_{i,t-1}] + \beta_1[\Delta REV_{i,t}/AST_{i,t-1}] + \beta_2[PPE_{i,t}/AST_{i,t-1}] + \varepsilon_{i,t}} \quad \textbf{(3a)}$$

$$\mathbf{TA_{i,t}/AST_{i,t-1} = \beta_0[1/\ AST_{i,t-1}] + \beta_1[\Delta REV_{i,t}/AST_{i,t-1}] + \beta_2[PPE_{i,t}/AST_{i,t-1}] + \varepsilon_{i,t}} \quad \textbf{(3b)}$$

where

$\mathbf{TA_{i,t}}$	=	total accruals for estimation portfolio firm i for quarter t,
$\mathbf{AST_{i,t-1}}$	=	total lagged assets for estimation portfolio firm i for quarter t,
$\mathbf{\Delta REV_{i,t}}$	=	change in revenues for estimation portfolio firm i for quarter t,
$\mathbf{\Delta REC_{i,t}}$	=	change in receivables for estimation portfolio firm i for quarter t,
$\mathbf{PPE_{i,t}}$	=	gross property, plant, and equipment for estimation portfolio firm i for quarter t,
$\boldsymbol{\varepsilon_{i,t}}$	=	error term for estimation portfolio firm i for quarter t,
$\boldsymbol{i}$	=	1…I_j, estimation firm index for the number of firms in the estimation portfolios (ranging from X to X firms),
$\boldsymbol{t}$	=	prediction quarter(s) (for quarters t_{-1}, t_0, t_{+1}).

Ordinary least squares regression was used to obtain estimates b_0, b_1, b_2, of parameters β_0, $\beta_1$and β_2 respectively, from equation (3). The parameters were used to compute both standardized and unstandardized prediction errors. Nondiscretionary total accruals (NDTA) were calculated as:

$$NDTA_{j,t} = b_0[1/AST_{j,t-1}] + b_1[\Delta REV_{j,t}/AST_{j,t-1}] + b_2[PPE_{j,t}/AST_{j,t-1}] \quad (4a)$$

$$NDTA_{j,t} = b_0[1/AST_{j,t-1}] + b_1[\Delta REV_{j,t} - \Delta REC_{j,t}/AST_{j,t-1}] + b_2[PPE_{j,t}/AST_{j,t-1}] \quad (4b)$$

where

$NDTA_{j,t}$ = total nondiscretionary accruals for troubled firm j for quarter t,
$AST_{j,t-1}$ = total lagged assets for troubled firm j for quarter t,
$\Delta REV_{j,t}$ = change in revenues for troubled firm j for quarter t,
$\Delta REC_{j,t}$ = change in receivables for troubled firm j for quarter t,
$PPE_{j,t}$ = gross property, plant, and equipment for troubled firm j for quarter t,
j = 1,.....N, troubled firm index,
t = prediction quarter(s) (for quarters t_{-1}, t_0, t_{+1}).

Following Teoh, Welch, and Wong (1998a), discretionary total accruals (DTA) are represented by the residuals:

$$DTA_{j,t} = TA_{j,t}/AST_{j,t-1} - NDTA_{j,t} \quad (5a)$$

$$DTA_{j,t} = TA_{j,t}/AST_{j,t-1} - NDTA_{j,t} \quad (5b)$$

where

$DTA_{j,t}$ = total discretionary accruals for troubled firm j for quarter t,
$AST_{j,t-1}$ = total lagged assets for troubled firm j for quarter t,
$TA_{j,t}$ = total accruals for troubled firm j for quarter t,
j = 1,.....N, troubled firm index,
t = prediction quarter(s) (for quarters t_{-1}, t_0, t_{+1}).

4.2 Data

4.2.1 Data Sources

The list of troubled NASDAQ firms and security price data used in this study was purchased from the *University of Chicago Center for Research in Security Prices (CRSP®)*. CRSP is a financial research center at the University of Chicago, Graduate School of Business (GSB) that creates and maintains historical U.S. databases for stock (NASDAQ, AMEX, NYSE), indices, bond, and mutual fund securities. Daily stock price data are available for the NASDAQ from December 14, 1972 to the present. CRSP also

offers uninterrupted time-series analysis by tracking securities across time (PERMNO® and PERMCO®), regardless of identifier changes to CUSIP, ticker, company name, SIC Code, and exchange.

The financial statement data in this dissertation were obtained from the *Standard and Poor's (S&P) COMPUSTAT (North America) Database*. The database maintains 20 years' of annual data history (optional history available to 1950) and up to 48 quarters of history (optional history available to 1962). The COMPUSTAT-supplied data used in this study were discussed earlier in this chapter. COMPUSTAT data were accessed through Wharton Research Data Services (WRDS) <http://wrds.wharton.upenn.edu>.[48]

The *Lexis-Nexis Academic Universe* database and the *COMPUSTAT (North America) Database* were also used to collect information on specific control variables that affect the use of discretionary accruals management including management changes or removals, auditor going-concern opinions, bankruptcy, debt covenant violations, and reductions in the firm's normal dividend policy.

4.2.2 Control Variables That Affect the Use of Discretionary Accruals

The degree of discretion exercised by management is a function of its potential opportunities and related incentives for engaging in the behavior. In turn, these related incentives can ultimately lead to differences in the effectiveness of the abnormal accrual models to estimate and detect the presence of earnings management.

[48] The study used the following annual COMPUSTAT data: DATA4: Current Assets, DATA5: Current Liabilities, DATA6: Total Assets, DATA12: Sales (net), DATA16: Income Taxes Total, DATA25: Common shares outstanding, DATA66: Discontinued Operations, DATA123: Income before extraordinary items, DATA170: Pretax Income, DATA172: Net Income (Loss), DATA178: Operating Income after Depreciation, DATA181: Liabilities-Total, DATA192: Extraordinary Items, DATA199: Price-fiscal year-close, and DATA308: Operating cash flows. The study also used quarterly COMPUSTAT data numbers, which are included in the footnotes of each table.

As noted by DeAngelo, DeAngelo, and Skinner (1994), a necessary step in the designation of the sample is to control for potentially conflicting incentives. Considering the likely distressed state of the firm due to delisting concerns, it is unlikely that managers have clear incentives to reduce income. This is supported by previous research documenting managers' use of earnings management to increase earnings in an attempt to keep their jobs (DeAngelo, 1988); (Moyer, 1990) or to defer the large bonus and salary reductions imparted to them as a result of the poor earnings and/or financial state of the firm (Gilson and Vetsuypens, 1993). I did not attempt to test a specific hypothesis regarding these factors in this study, but instead tried to control for these effects when examining the results of the statistical analysis.

During the data collection process, I collected additional information to control for factors that affect the magnitude and direction of the discretionary accrual. These include management changes, auditor going-concern opinions/bankruptcy, debt covenant violators, and cuts in the firm's normal dividend. Results are presented both with and without the potentially contaminated firms.

4.2.2.1 Factors That Affect the Use of Discretionary Accruals

DeAngelo, DeAngelo, and Skinner (1994) found a high incidence of managerial turnover within their sample of firms experiencing financial distress. Additionally, empirical evidence suggests that incoming CEOs "take a bath," managing earnings downward in the year of the change to clean up the financial statements in an attempt to begin anew [DeAngelo (1988); Murphy and Zimmerman (1993)]. This also allows the incoming management team to attribute this poor performance to past managers (Pourciau, 1993). Thus, I conducted a keyword search of the Lexis-Nexis Academic Universe database to identify CEO changes. If a CEO change occurs during the estimation

period, the expected accruals should be biased downward, and if the CEO change occurred during the sample period, the actual accruals should likewise be biased downward.

According to Stice (1991), auditors that issue a going-concern opinion for a client firm are likely to be more attentive and conservative in the audit work because the looming possibility of litigation should the clients go bankrupt. Thus, during this period of uncertainty, the abnormal accruals can be expected to be negative. COMPUSTAT (Annual Item 149) reports information on the specific auditor and audit opinion issued. A keyword search of the Lexis-Nexis Academic Universe database was conducted to identify bankruptcy.

Dividend reductions have been shown to be a strong negative signal to the market (Bessler and Nohel, 1996). If management cuts the firm's normal dividend during the sample period, one might expect management to "take a bath," as the effect of the dividend reduction will likely exert downward pressure on firm value anyway. Thus, this scenario should give rise to mangers employing a strategy of income-decreasing accrual management based on the reduction in dividend, rather than a strategy of income-increasing accruals to maintain their listing.

A firm might elect to reverse split its stock for a number of reasons. The motives include the belief that such measures enhance the company's image among investors, increase the company's marketability and liquidity, reduce shareholder servicing expenses, or maintain stock exchange requirements. Most studies concur that reverse splits are strong signals to the marketplace of management's lack of confidence in future stock price increases resulting from earnings improvement. If management elects to reverse split its stock during the sample period, an expectation might exist for

management to "take a bath," as the effect of the reverse stock split will likely exert downward pressure on firm value anyway.

4.2.3 Data Selection Criteria

To be included in the troubled-firm sample, the company must have satisfied the following criteria:

1) The firm must have been a NASDAQ National Market® firm with a share price of $1 or less sometime during the period of March 1, 1997- September 27, 2001. The beginning date of this period was specifically selected due to the NASDAQ's tightening of its listing requirements, specifically regarding the minimum stock price requirement instituted in March 1997. The ending date relates to the suspension of the rule to allow companies with share prices of less than $1 to remain listed. [49]
2) Only non-financial, non-regulated firms are included in the sample. The financial reporting practices of these firms are different from those of industrial firms. Therefore, firms in the utilities (SIC 4911-4941), banking and financial services (SIC 6021-6282), insurance (SIC 6311-6411), and real estate (SIC 6500-6799) industries are excluded from the sample.
3) The firm must have a December fiscal year-end. This was required so that seasonal differences across the calendar year were eliminated when the cross-sectional version of the Jones model was used to estimate discretionary accruals.

[49] The Securities and Exchange Commission approved the new listing qualification standards of the NASDAQ in August 1997, which was applied retroactively to all issues after March 1997. These standards remained in place through September 2001.

4) The firm's financial accounting data had to be available on the *COMPUSTAT* quarterly Primary, Supplemental, Tertiary (PST), or Full Coverage (FC) COMPUSTAT files or merged industrial files.

5) The firm was required to have a minimum of 12 quarterly observations from the period prior to the event period to estimate the parameters of the time-series models. No such requirement is made of the cross-sectional models.

4.2.4 Sample Dataset Construction

The list of troubled NASDAQ National firms and security price data used in this study was provided by the *University of Chicago Center for Research in Security Prices (CRSP®)*. CRSP provided a custom extraction of all NASDAQ National firms and the initial date on which the firm's closing share price dropped to $1.00 or less, including the CUSIP (Committee on Uniform Security Identification Procedures), PERMNO (permanent issue identification number, a unique number assigned by CRSP to each security in the CRSP stock files), PERMCO® (permanent company identification number), and ticker symbol for the period of March 1, 1997 through September 27, 2001.[50] The initial search yielded 1,330 firms.

Next, CRSP's permanent, unique identifiers, PERMNO® and PERMCO® were mapped with COMPUSTAT's permanent, unique company identifier, GVKEY, to provide a seamless time-series examination of CRSP and COMPUSTAT company data. Some of the firms were deleted due to their inclusion on the NASDAQ Small Cap market during the period of investigation. Other firms were removed due to their violation of one or more of

[50] CUSIPs are not unique identifiers because they can be reassigned to other companies if substantial changes happen to the original company. Events like moving the head offices, changing the company name, bankruptcy, merging with another firm, and changing the company's nature of business are just some of the factors that could lead to a change in CUSIP for a firm, or that could cause the CUSIP to be put back into the pool of available CUSIP numbers for eventual reassignment to another security. Stock ticker symbols and SIC codes are not unique, nor are company names for similar reasons. Since CRSP can track all changes to a security via the PERMNO, all trading events for a security can be kept together, regardless of changes in that company's history.

the five criteria listed in Section 4.2.3 above. The final sample consisted of 215 firms for the time-series analysis and 495 firms for the cross-sectional analysis. Table 2 reports the details of how the final sample was constructed. The names of the firms in the sample are listed in Appendix B.

Table 2

Sample dataset construction

NASDAQ National Market firms with a bid price of $1.00 or less sometime from March 1997- September 2001	1,330
Less:	
Third-quarter 2001 firms subject to delisting moratorium	(111)
Less:	
Firms in excluded industries	
Utilities (SIC 4911-4941)	(2)
Banking and financial services (SIC 6021-6282)	(33)
Insurance (SIC 6311-6411)	(12)
Real estate (SIC 6500-6799)	(16)
Firms with non-December fiscal year-end	(367)
Firms with incomplete CRSP data	(60)
Firms with missing quarterly COMPUSTAT data	(234)
Total sample size for cross-sectional tests	495
Firms with insufficient time-series data	(280)
Total sample size for time-series tests	215

Chapter 5: Analysis of Results

This chapter provides the results of the regression analyses of the accrual-based earnings management models described in the previous chapter. The descriptive statistics of the data are displayed first, followed by the hypothesis testing for both the time-series models and cross-sectional models. The final section discusses the results and provides conclusions.

5.1 Descriptive Statistics

5.1.1 Profile of Troubled NASDAQ National Market® Firms

The distribution of the sample firms by two-digit Standard Industrial Classification (SIC) code and by year the firm entered its "troubled" period is reported in Table 3. In panel A, the sample firms represent 41 industries (34 for the time-series analysis), with the greatest concentration of firms (150 firms, 29.4%) in the business services industry (SIC 73) in Panel A (45 firms, 19.6% in the time-series portion). The remaining sample firms are fairly evenly distributed in the other 40 industries (33 for the time-series analysis) and are approximately evenly distributed across time with a larger percentage of firms over the last two years in the sample.

Panel A of Table 4reports the median values of several performance measurements including sales growth, operating margins, extraordinary items to sales, discontinued operations to sales, net earnings margin, and current ratio. These measures are presented for event years -3 to +2 for the sample of troubled NASDAQ National Market firms.

The median net earnings margin is negative for all years, indicating that a large majority of the firms have losses during the periods under investigation. This is further supported by the 0% tax rate and the negative ROA throughout the six-year examination. The steep decline in net earnings margin is not driven by below-the-line income statement accounts such as extraordinary items or discontinued operations. The median values for these items are zero for all years. The leverage ratios decline through the year in which the firm enters the period of listing uncertainty (year 0) and then grow through year +2, while the median firm's total assets and current ratio increase through year 0 and then decline through year +2. The descriptive information included in Table 5 supports the presumption that these firms are indeed *troubled* firms.

Panel B of Table 4 reports the median values of the same performance measurements in Panel A of Table 4, excluding firms from the SIC codes 7300-7399: Business Services, which comprise approximately 20% of the firms in the time-series analysis and 30% in the cross-sectional analysis (see Table 3, Panel A). A sensitivity analysis was conducted to see if the high number of firms in these industry codes affected the results. There were no material differences between Panels A and B in Table 4. A number of small, yet important differences were noted however. The firms depicted in Panel B exhibit slightly higher debt loads, marginally smaller net and operating losses, and higher levels of net sales. Surprisingly, these firms were shown to hold significantly smaller levels of total assets.

Table 3

Industry and event-year distribution for sample firms

Panel A. Sample distribution by industry

		Time-series Tests		*Cross-Sectional Tests*	
SIC	Industry	Frequency	Percentage	Frequency	Percentage
10	Metal mining	2	0.93%	5	1.01%
13	Oil and gas extraction	5	2.33%	12	2.42%
15	Building construction-general contr, op bldr		0.00%	2	0.40%
20	Food and kindred products	4	1.86%	5	1.01%
22	Textile mill products		0.00%	1	0.20%
23	Apparel & other finished products	1	0.47%	2	0.40%
24	Lumber and wood products, ex furn	1	0.47%	1	0.20%
25	Furniture and fixtures		0.00%	1	0.20%
26	Paper and allied products	1	0.47%	2	0.40%
27	Printing, publishing, and allied	2	0.93%	9	1.82%
28	Chemicals & allied products	31	14.42%	39	7.88%
30	Rubber & misc plastics products	1	0.47%	2	0.40%
31	Leather and leather products	1	0.47%	2	0.40%
34	Fabr metal, ex machinery, trans equipment	4	1.86%	4	0.81%
35	Industrial machinery and equipment	11	5.12%	22	4.44%
36	Electronic and other electrical equipment	23	10.70%	38	7.68%
37	Transportation equipment	4	1.86%	4	0.81%
38	Instruments and related products	15	6.98%	28	5.66%
39	Misc manufacturing industries	3	1.40%	8	1.62%
42	Motor freight transportation, warehousing	1	0.47%	3	0.61%
45	Transportation by air	1	0.47%	2	0.40%
48	Communications	13	6.05%	42	8.48%
49	Electric, gas, sanitation services	1	0.47%	2	0.40%
50	Durable goods-wholesale	6	2.79%	14	2.83%
51	Nondurable goods-wholesale	4	1.86%	8	1.62%
52	Building material, hardware, garden-retail	1	0.47%	2	0.40%
54	Food stores	1	0.47%	2	0.40%
55	Auto dealers, gas stations		0.00%	2	0.40%
56	Apparel & accessory store		0.00%	1	0.20%
57	Home furniture and equipment store		0.00%	5	1.01%
58	Eating and drinking places	4	1.86%	8	1.62%
59	Miscellaneous retail	7	3.26%	16	3.23%
62	Security & commodity brokers	1	0.47%	1	0.20%
72	Personal services	1	0.47%	2	0.40%
73	Business services	42	19.53%	147	29.70%
75	Auto repair, services, parking		0.00%	2	0.40%
78	Motion pictures	3	1.40%	6	1.21%
79	Amusements, recreation	2	0.93%	6	1.21%
80	Health services	13	6.05%	18	3.64%
82	Educational services		0.00%	3	0.61%
87	Engineering and management services	5	2.33%	16	3.23%
	Totals	215	100.00%	495	100.00%

Notes: The sample includes NASDAQ National market firms with a share price of $1 or less sometime during the period of March 1997- July 2001 as reported by CRSP. An initial sample of 1330 firms was identified from these sources and of these firms, 495 and 215 had the data and characteristics necessary for empirical analyses for cross-sectional and time-series tests, respectively.

Table 3, continued

Industry and event-year distribution for sample firms

Panel B: Sample distribution by year

	Time-series Tests		*Cross-Sectional Tests*	
Year	Frequency	Percentage	Frequency	Percentage
1997	30	13.95%	48	9.70%
1998	59	27.44%	117	23.64%
1999	28	13.02%	56	11.31%
2000	74	34.42%	189	38.18%
2001	24	11.16%	85	17.17%
Totals	215	100.00%	495	100.00%

Notes: The sample includes NASDAQ National market firms with a share price of $1 or less sometime during the period of March 1997- July 2001 as reported by CRSP. An initial sample of 1330 firms was identified from these sources and of these firms, 495 and 215 had the data and characteristics necessary for empirical analyses for cross-sectional and time-series tests, respectively.

5.1.2 Early Test of Accrual Manipulation

Following Jones (1991) and DeFond and Jiambalvo (1994), the descriptive statistics presented in Table 4 are based on the DeAngelo (1986) expectations model. In this earlier version of the accrual expectations model, total accruals from the prior period are estimated to reflect "normal" total accruals. In this way, "abnormal" total accruals are defined as the difference between current period total accruals and "normal" total accruals. By expanding total accruals into discretionary and nondiscretionary accruals, the following equation is derived:

$$\mathbf{\Delta TA_t = (TA_t - TA_{t-k}) = (DA_t - DA_{t-k}) - (NDA_t - NDA_{t-k}).} \quad \mathbf{(6)}$$

DeAngelo's (1986) accrual expectations model relies on the assumption that the average change in nondiscretionary accruals ($NDA_t - NDA_{t-k}$), is approximately zero, so that a change in total accruals ($TA_t - TA_{t-k}$) primarily reflects the change in discretionary accruals ($DA_t - DA_{t-k}$).

Table 5 profiles the troubled firms with respect to total accrual changes, earnings changes, cash flow changes, and revenue changes in the three years prior to the share price dropping below the market minimum; during the concurrent year in which the share price drops below the market minimum; and two years subsequent to the decline. The scaled changes are computed as the first differences of the variables ($X_t - X_{t-1}$), divided by lagged total assets at time t-1.

Note that the number of observations decreases in the years both prior to and subsequent to year 0. This is due to missing COMPUSTAT data or extreme observations

that were eliminated using the DFFITS procedure.[51] In an effort to preserve comparability and ensure that the observed trends over time are not due to differences in sample sizes, the results for year -1 through +1 were recalculated using the same 312 firms found in each of the periods. The results are presented in Table 6 and are qualitatively the same as those presented in Table 5.

Notice that this section reports descriptive statistics based on annual rather than quarterly data. This is due to problems related to seasonal issues with quarterly data that could not adequately be controlled for. Moreover, Dechow (1992) documents significant negative serial correlation in accrual changes based on this methodology "consistent with deflated accruals being independently, identically distributed with constant mean and variance." The first-order autocorrelation for such a series will be zero, but differencing such a stationary process induces negative serial correlation (of -0.5) (DeFond and Jiambalvo, 1994). In light of these conditions, the accrual changes are included as descriptive information only.

Table 5 summarizes the scaled changes in total accruals, earnings, operating cash flow, and revenue for the sample for years -3 through +2 along with fair market value of the firms in question. As mentioned previously, the scaled changes are computed as the first differences of each respective variable divided by lagged total assets. Table 5 reports the mean and median change for each of the variables, as well as the number of negative and positive changes, t-statistics, and the parametric and nonparametric (Wilcoxon signed-rank test) p-values.

[51] Following Shivakumar (2000), errors in COMPUSTAT, infrequent transactions (such as large asset sales and acquisitions), and economic transactions in the early stages of a firm's life cycle affect accruals and cash flows estimates for firms in the estimation sample. The outliers substantially increase the noise in the estimates of the abnormal accruals reducing the reliability of the estimates. This examination was also used including these influential observations. The statistical significance of the results is weakened slightly, but the tenor of the results is unaffected.

Panel A of Table 5 reports the changes in accruals scaled by lagged total assets. Prior to year -1, all of the accrual changes are relatively small in magnitude (and insignificant). During the year in which the share price drops below the market minimum (Year 0), the mean (median) change in scaled accruals is -0.092 (-0.068). The change is statistically significant at p=0.000 using a two-tailed t-test and at p=0.000 using a two-tailed Wilcoxon test. In the year prior to the decline in the share price below the market minimum (Year -1), the mean (median) change in scaled accruals is -0.057 (-0.034). The change is statistically significant at p=0.000 using a two-tailed t-test and at p=0.000 using a two-tailed Wilcoxon test. If the changes in accruals are viewed in isolation, year -1 and 0 suggest that managers were making income-decreasing, not income-increasing, accrual decisions during the periods in which their listing was in greatest jeopardy. This might have occurred for a number of reasons. As discussed previously, a number of troubled firms had management changes, bankruptcy issues, or used reverse stock splits. These firms were more likely to have had incentives to make income decreasing accruals. The decrease might also be due to changes in economic factors (not controlled for by the model). As indicated in Panels B through D, changes in earnings and operating cash flow were significantly negative generally from year -3 through year 0, and significantly positive for year +1 and year +2, whereas changes in revenue were significantly positive from year -3 through year -1 and significantly negative for year 0 and year +1. Figure 4 depicts the percentage changes in total accruals, earnings, and cash flow from operations. As Jones (1991) notes, changes in accruals might reflect changes in the firm's economic circumstances – changes which are observed in Panels B through D. These firms are going through some form of economic trouble given the information in Table 4 and Panels B through D in Table 5 in addition to a declining share price. Panel E reflects the mean and median (and standard deviation) fair market value of the sample firms. Note the steady decline of the median over the six-year period reflecting a sharp decline in the fair market

value of the firms through year +2. The changes in accruals must be examined with caution because these changes are likely to reflect changes in the economic circumstances of the firm rather than accrual manipulation. The subsequent sections report on the time-series and cross-sectional models used to control for these economic changes.

Table 4

Median operating performance, leverage, liquidity, and size statistics for troubled NASDAQ National Market firms

Panel A

	Year -3 *n=395*	*Year -2* *n=460*	*Year -1* *n=469*	*Year 0* *n=469*	*Year +1* *n=374*	*Year +2* *n=273*
Sales growth	27.22%	31.76%	22.81%	-5.19%	-8.10%	-1.03%
Operating profit margin [a]	-5.83%	-16.51%	-25.89%	-39.91%	-20.10%	-10.25%
Extraordinary items/Sales	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Discontinued operations/Sales	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Net earnings margin [b]	-10.65%	-22.56%	-36.74%	-61.13%	-25.02%	-14.23%
Total debt/Total assets [d]	42.82%	38.04%	36.65%	47.61%	48.29%	49.68%
Tax rate [c]	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
ROA	-8.70%	-16.59%	-24.30%	-47.97%	-29.40%	-17.87%
Net sales ($ millions)	17.51	20.01	29.48	26.54	22.15	24.32
Total assets ($millions)	27.80	35.92	46.57	34.60	26.50	25.18
Current ratio	2.24	2.37	2.36	1.73	1.70	1.62

Notes:
Notes: All COMPUSTAT data references relate to ANNUAL data in this Table.
(a) Operating profit margin is defined as operating income after depreciation (DATA 123) divided by net sales (DATA 12).
(b) Net earnings margin is defined as net income (DATA 170) divided by net sales (DATA 12).
(c) Tax rate is defined as income taxes (DATA 16) minus changes in deferred taxes divided by pretax income (DATA 170). If the income taxes are less than or equal to zero or if pre-tax income is less than or equal to zero, then the tax rate is set to zero. If the calculated tax rate is greater than one (less than one), the tax rate is set equal to one (zero).
(d) Total debt/total assets is defined as total liabilities (DATA 181) divided by total assets (DATA6).

Table 4 continued

Median operating performance, leverage, liquidity, and size statistics for troubled NASDAQ National Market firms (with SIC codes 7300-7399 removed)

Panel B

	Year -3 *n=297*	*Year -2* *n=329*	*Year -1* *n=335*	*Year 0* *n=336*	*Year +1* *n=271*	*Year +2* *n=211*
Sales growth	24.42%	26.70%	16.46%	-3.90%	-5.85%	-0.30%
Operating profit margin [a]	-3.98%	-9.27%	-16.65%	-27.54%	-14.49%	-6.42%
Extraordinary items/Sales	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Discontinued operations/Sales	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Net earnings margin [b]	-8.60%	-18.06%	-25.47%	-42.45%	-19.47%	-11.18%
Total debt/Total assets [d]	45.32%	41.71%	42.87%	50.30%	50.75%	49.34%
Tax rate [c]	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
ROA	-7.25%	-13.33%	-20.61%	-38.05%	-24.31%	-14.84%
Net sales ($ millions)	30.55	38.51	47.31	37.03	29.96	27.78
Total assets ($millions)	18.43	23.05	30.76	29.34	26.26	26.08
Current ratio	2.23	2.50	2.29	1.57	1.61	1.63

Notes:
Notes: All COMPUSTAT data references relate to ANNUAL data in this Table.
(a) Operating profit margin is defined as operating income after depreciation (DATA 123) divided by net sales (DATA 12).
(b) Net earnings margin is defined as net income (DATA 170) divided by net sales (DATA 12).
(c) Tax rate is defined as income taxes (DATA 16) minus changes in deferred taxes divided by pretax income (DATA 170). If the income taxes are less than or equal to zero or if pre-tax income is less than or equal to zero, then the tax rate is set to zero. If the calculated tax rate is greater than one (less than one), the tax rate is set equal to one (zero).
(d) Total debt/total assets is defined as total liabilities (DATA 181) divided by total assets (DATA6).

Table 5

Accrual changes, earnings changes, cash flow changes, and revenue changes scaled by lagged total assets and fair market value by year relative to NASDAQ National Market firm entering period of listing uncertainty in the period 1997-2001.[a]

	Year -3	*Year -2*	*Year -1*	*Year 0*	*Year +1*	*Year +2*
	n=279	*n=342*	*n=405*	*n=449*	*n=336*	*n=237*
Panel A: Accrual Changes [b]						
Mean	-0.022	-0.022	-0.057	-0.092	0.070	0.044
Median	-0.028	-0.017	-0.034	-0.068	0.039	0.004
#negative:#positive	160:119	181:161	251:154	294:155	138:198	118:119
t-statistic	-1.326	-1.462	-4.297	-7.360	4.034	2.149
Parametric p-value [c]	0.186	0.145	0.000	0.000	0.000	0.033
Significance Test for Wilcoxon signed-ranks test [d]	0.068	0.119	0.000	0.000	0.000	0.182
Panel B: Earnings Changes [e]						
Mean	-0.046	-0.132	-0.258	-0.117	0.272	0.121
Median	-0.017	-0.039	-0.079	-0.079	0.118	0.035
#negative:#positive	153:126	205:136	291:114	299:150	97:239	91:146
t-statistic	-1.948	-4.996	-5.107	-6.589	8.402	3.871
Parametric p-value [c]	0.052	0.000	0.000	0.000	0.000	0.000
Significance Test for Wilcoxon signed-ranks test [d]	0.086	0.000	0.000	0.000	0.000	0.000
Panel C: Cash Flow (from Operations) Changes [f]						
Mean	-0.025	-0.111	-0.201	-0.025	0.201	0.077
Median	0.001	-0.027	-0.052	-0.015	0.081	0.043
#negative:#positive	137:142	194:147	265:140	254:195	99:237	90:147
t-statistic	-1.201	-4.597	-4.265	-1.860	7.289	3.629
Parametric p-value [c]	0.231	0.000	0.000	0.064	0.000	0.000
Significance Test for Wilcoxon signed-ranks test [d]	0.396	0.000	0.000	0.033	0.000	0.000
Panel D: Revenue Changes						
Mean	0.394	0.525	0.258	-0.057	-0.139	-0.010
Median	0.149	0.152	0.082	-0.028	-0.039	0.002
#negative:#positive	68:211	77:264	124:281	252:197	194:142	113:124
t-statistic	7.373	7.330	7.196	-2.519	-3.201	-0.258
Parametric p-value [c]	0.000	0.000	0.000	0.012	0.001	0.797
Significance Test for Wilcoxon signed-ranks test [d]	0.000	0.000	0.000	0.001	0.000	0.803
Panel E: Fair Market Value [g]						
Mean	131.746	178.944	124.171	23.097	38.198	40.308
Median	68.609	68.526	41.650	13.316	12.822	12.042
Standard Deviation	218.475	381.776	295.633	33.205	80.635	90.202

Notes: All COMPUSTAT data references relate to ANNUAL data in this Table.
(a) The scaled changes in the variables were computed as the first difference of the variables (X_t – X_{t-1}) divided by total assets at time t-1.
(b) The total accruals were measured from COMPUSTAT annual data and defined as item 123, net income before extraordinary income, minus item 308, operating activities-net cash flow.
(c) The parametric p-value is for a two-tailed t-test.
(d) The nonparametric p-value is for a two-tailed Wilcoxon test.
(e) Earnings were defines as COMPUSTAT item 123, net income before extraordinary income.
(f) Operating cash flows were defines as COMPUSTAT item 308, operating activities-net cash flow.
(g) FMV was calculated by multiplying COMPUSTAT item 25, common shares outstanding by COMPUSTAT item 199, share price-fiscal year-close.

Figure 4

Median Change in % for Total Accruals, Earnings, and Cash Flow from Operations

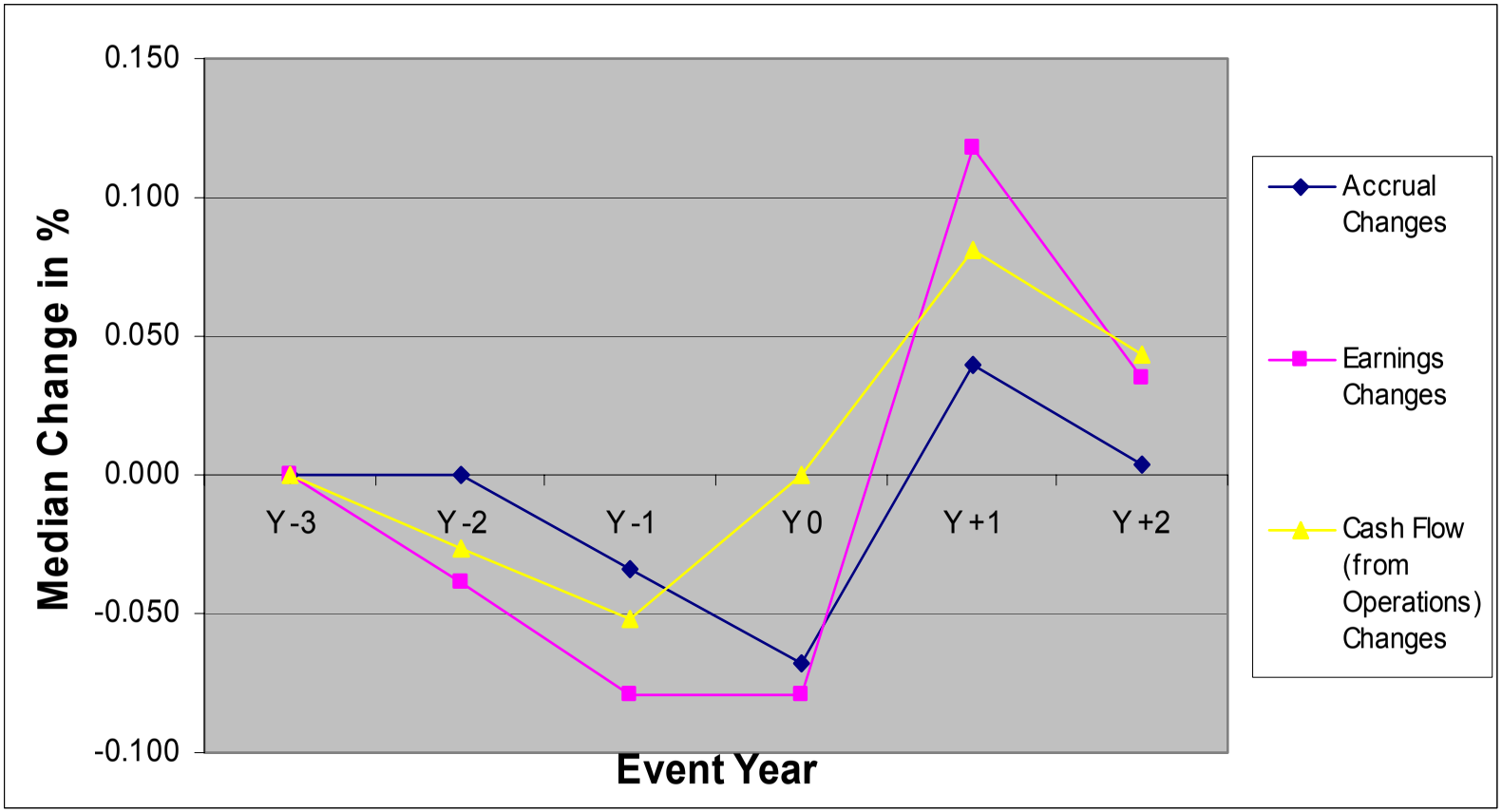

Table 6

Accrual changes, earnings changes, cash flow changes, and revenue changes scaled by lagged total assets and fair market value by year relative to NASDAQ National Market firm entering period of listing uncertainty in the period 1997-2001 using same 312 firms.[a]

	Year -1 *n=312*	*Year 0* *n=312*	*Year +1* *n=312*
Panel A: Accrual Changes [b]			
Mean	-0.046	-0.064	0.067
Median	-0.027	-0.061	0.039
#negative:#positive	187:125	202:110	127:185
t-statistic	-3.107	-4.935	3.791
Parametric p-value [c]	0.002	0.000	0.000
Significance Test for Wilcoxon signed-ranks test [d]	0.000	0.000	0.001
Panel B: Earnings Changes [e]			
Mean	-0.253	-0.074	0.252
Median	-0.066	-0.060	0.106
#negative:#positive	221:91	197:115	93:219
t-statistic	-4.006	-4.140	7.632
Parametric p-value [c]	0.000	0.000	0.000
Significance Test for Wilcoxon signed-ranks test [d]	0.000	0.000	0.000
Panel C: Cash Flow (from Operations) Changes [f]			
Mean	-0.207	-0.011	0.185
Median	-0.049	-0.007	0.078
#negative:#positive	201:111	169:143	98:214
t-statistic	-3.493	-0.771	6.494
Parametric p-value [c]	0.001	0.441	0.000
Significance Test for Wilcoxon signed-ranks test [d]	0.000	0.456	0.000
Panel D: Revenue Changes			
Mean	0.247	-0.066	-0.136
Median	0.073	-0.038	-0.041
#negative:#positive	99:213	185:127	181:131
t-statistic	5.828	-2.491	-2.936
Parametric p-value [c]	0.000	0.013	0.004
Significance Test for Wilcoxon signed-ranks test [d]	0.000	0.000	0.000
Panel E: Fair Market Value [g]			
Mean	108.284	23.796	39.479
Median	39.816	13.928	13.190
Standard Deviation	260.654	33.674	83.138

Notes: All COMPUSTAT data references relate to ANNUAL data in this Table.
(a) The scaled changes in the variables were computed as the first difference of the variables (X_t – X_{t-1}) divided by total assets at time t-1.
(b) The total accruals were measured from COMPUSTAT annual data and defined as item 123, net income before extraordinary income, minus item 308, operating activities-net cash flow.
(c) The parametric p-value is for a two-tailed t-test.
(d) The nonparametric p-value is for a two-tailed Wilcoxon test.
(e) Earnings were defines as COMPUSTAT item 123, net income before extraordinary income.
(f) Operating cash flows were defines as COMPUSTAT item 308, operating activities-net cash flow.
(g) FMV was calculated by multiplying COMPUSTAT item 25, common shares outstanding by COMPUSTAT item 199, share price-fiscal year-close.

5.2 Tests of Hypotheses

The tests of accrual manipulation were performed for total accruals using both the Jones (1991) and modified Jones (Dechow, Sloan, and Sweeney (1996)) models. Due to data requirements (discussed previously and reported in Table 2), the time-series tests were performed on 215 of the troubled NASDAQ National Market firms in examining the first hypothesis, while the cross-sectional tests, which examine the second hypothesis, were performed on the full sample of 495 firms. The advantages and disadvantages of each approach are outlined in Section 4.1.4.2.

5.2.1 Time-Series Analysis

The time-series analysis in this study follows the analysis presented in Jones (1991) and Dechow, Sloan, and Sweeney (1996). Each of these studies estimated normal total accruals as a function of gross property, plant, and equipment and changes in revenues to control for changes in nondiscretionary accruals caused by changing economic conditions. Property, plant, and equipment are included in the model to control for the portion of total accruals related to the nondiscretionary deprecation expense, whereas the revenues are included because they are considered an objective measure of the firms' operations before the manipulations of managers. According to Jones (1991), revenues are not completely exogenous because managers have discretion over when and how events are recognized in the financial statements, as well as the timing of certain economic events.[52]

[52] Jones (1991) uses the example that "managers may postpone shipment of merchandise during import relief investigation years in order to postpone recognition of revenue until the following year."

All time-series data prior to quarter -1 were used to estimate the parameters in the following model for each of the troubled NASDAQ National Market firms:

$$\mathbf{TA_{jt}/AST_{jt-1} = \beta_{0j}[1/\ AST_{jt-1}] + \beta_{1j}[\Delta REV_{jt}\ /\ AST_{jt-1}] + \beta_{2j}[PPE_{jt}/AST_{jt-1}] + \varepsilon_{jt}} \quad \mathbf{(1)}$$

where

$\mathbf{TA_{jt}}$	=	total accruals for firm *j* in quarter *t*,
$\mathbf{AST_{jt-1}}$	=	total lagged assets for firm *j* in quarter *t-1,*
$\mathbf{\Delta REV_{jt}}$	=	revenues for firm *j* in quarter *t* less revenues for quarter *t-1*,
$\mathbf{PPE_{jt}}$	=	gross property, plant, and equipment for firm *j* in quarter *t*,
ε_{jt}	=	error term for firm *j* in quarter *t*, a residual term which captures all the impacts on $\mathbf{TA_{jt}}$ other than those from $\mathbf{\Delta REV_{jt}}$ and $\mathbf{PPE_{jt}}$,
j	=	1,….215, firm index,
t	=	1….T_j, time period (quarter) index for firm *j*'s estimation period; T_j ranges from 12 quarters to 43 quarters.

All variables in the model were scaled by lagged total assets to reduce heteroskedasticity. Following Jones (1991), the parameter estimates in this study are used for predictive purposes rather than for testing the statistical significance of the parameters. Thus, the problem of biased standard error estimates associated with heteroskedasticity is not a serious concern. The error terms in this portion of the study are also likely to be autoregressive because of the use of time-series data. According to Kmenta (1971), however, parameter estimates will be unbiased and consistent in the presence of autoregression and heteroskedasticity.

Due to the fact that the event window used in this study was post-1988 (post-SFAS 95), the cash flow approach, which measures accruals directly from the statement of cash flows, was used in this study to calculate the actual total accruals. As outlined in Section 4.1.5, the cash flow approach has been determined to be more precise at computing total accruals (Collins and Hribar, 2002). Therefore, any time-series data prior to 1989 were eliminated from this analysis to avoid introducing significant measurement error into the

accrual estimates. Even when excluding these observations from the analysis, the average number of observations for each firm totaled 24.5 quarters.[53]

A serious limitation of the time-series approach is securing enough observations in the estimation period to compute the Z statistic for significance tests for the *standardized prediction errors*. As mentioned previously, Jones (1991) required 10 observations in her annual study, whereas Shivakumar required 20 observations in his quarterly (simulation) study. In this study, I required a minimum of 12 observations, but I also test and report the results in which firms have a minimum of 20 observations as in Shivakumar (1996). All firms lacking sufficient estimation quarters were eliminated from the time-series examination. This requirement reduced the time-series sample to 215 firms.

Following Jones (1991), ordinary least squares regressions were used to obtain estimates b_{0j}, b_{1j}, and b_{2j} of $\beta_{0j,}$ $\beta_{1j,}$ and β_{2j}, respectively, from equation (1) above. The prediction errors or residuals ($u_{jp)}$ represent the unexpected (discretionary) accruals from the estimation of the following models:

$$\mathbf{u_{jp} = TA_{jp}/AST_{jp-1} - (b_{0j}\,[1/AST_{jp-1}] + b_{1j}\,[\Delta REV_{jp}\,/AST_{jp-1}] + b_{2j}\,[PPE_{jp}/AST_{jp-1}]),} \quad \mathbf{(2a)}$$

$$\mathbf{u_{jp} = TA_{jp}/AST_{jp-1} - (b_{0j}[1/AST_{jp-1}] + b_{1j}\,[\Delta REV_{jp} - \Delta REC_{jt}\,/AST_{jp-1}] + b_{2j}\,[PPE_{jp}/AST_{jp-1}]),} \quad \mathbf{(2b)}$$

where **p** is the quarter for which normal accruals are predicted.

The prediction errors were calculated for each quarter in which the firm was in jeopardy of being delisted, defined as the quarter preceding, the quarter of, and the quarter following the share price dropping below $1.

[53] A great majority (78%) of the firms was formed and listed on the NASDAQ in the years subsequent to SAFS #95, and as such would not limit the time-series analysis.

Equation (2b) represents the modified version of the Jones model. The original Jones (1991) model was used to obtain estimates of the parameters and nondiscretionary accruals during the estimation period with the only adjustment being the inclusion of the change in receivables variable in the event period. The original Jones Model assumes that discretion is not exercised over the recognition of revenue in either the estimation period or the event period, whereas the modified version of the model assumes that all changes in credit sales in the event period result from management manipulation. This modification ensures the estimate of earnings management should no longer be biased toward zero in samples where accrual manipulation has taken place with revenue recognition issues.

Similar to Jones (1991) (following Patel,1976), the tests of significance were computed using both the standardized and unstandardized residuals from equation (2). The standardized prediction errors were computed as

$$\mathbf{V_{jp} = u_{jp} / \sigma(u_{jp}),} \qquad \mathbf{(7)}$$

where $\sigma(u_{jp})$ represents the standard deviation of the error term from the time-series model estimated for firm j.[54] The parametric significance tests of the standardized prediction errors was computed as

$$\mathbf{Z_{vp} = \sum V_{jp} / \sum [(T_j - k)/(T_j - (k+2))]^{1/2},} \qquad \mathbf{(8)}$$

where k is the model's degrees of freedom, and T_j is the total number of time-series observations for firm j. The unstandardized prediction errors are interpreted as a measure of the level of unexpected accruals as a percentage of total assets.

[54] According to DeFond and Jiambalvo (1994), the Z_{vp} statistic is asymptotically distributed as a unit normal deviate if the prediction errors are independent. Autoregressive error terms violate the assumption underlying Z_{vp},and thus any inferences based on this statistic must be made with caution. Parametric and nonparametric tests of the unstandardized prediction errors are reported due to the earlier limitation.

The mean (median) number of quarters used to estimate the 215 separate time-series regressions from the model in equation (1) was 24.53 (24.00). The coefficient on the change in revenue was generally positive (60%) with a mean (median) of 0.055 (0.093). The average t-statistic associated with the change in revenue was 1.333. Jones (1991) and DeFond and Jiambalvo (1994) reported mean coefficients on the change in revenue of 0.035 and 0.130 and average t-statistics of 0.220 and 1.593, respectively. The coefficient on property, plant, and equipment was generally negative (66%) with a mean (median) of -0.642 (-0.160). The average t-statistic associated with property, plant, and equipment was -0.618. Jones (1991) and DeFond and Jiambalvo (1994) reported mean coefficients on property, plant, and equipment of -0.033 and -0.028 and average t-statistics of -1.269 and -0.820, respectively. The average R^2 in Jones (1991) and DeFond and Jiambalvo (1994) was 0.232 and 0.537, respectively, while the average here was 0.334. Jones (1991) used a sample size of 23 firms with an average of 25 years of time-series data, while DeFond and Jiambalvo (1994) secured a sample size of 62 firms with an average of approximately 12 years of time-series data. Considering the major differences in sample selection criteria and sample sizes, the model estimates reported here are similar to those reported in the Jones (1991) and DeFond and Jiambalvo (1994) papers.

Following Jones (1991), Table 7 reports the standardized prediction errors (V_{jp}) and the related test statistics (Z_{vp}).[55] The standardized prediction errors are based on the prediction errors from the Jones (1991) accrual expectation model estimated over periods using all available data through quarter -2. The Z statistics for quarters -1, 0, and +1 are -2.63 (with a two-tailed significance level of 0.009), -5.69 (with a one-tailed significance level of 0.000), and -3.82 (with a two-tailed significance level of 0.000), respectively. The results are similar using the modified version of the Jones Model, where the Z statistic for

[55] A separate table for the standard prediction errors (V_{jp}) and the related test statistics (Z_{vp}) are not presented for the modified version of the Jones model. The significance tests are, however, presented in Tables 8 and 9.

quarters -1, 0, and +1 are -2.74 (with a two-tailed significance level of 0.007), -5.73 (with a one-tailed significance level of 0.000), and -3.99 (with a two-tailed significance level of 0.000), respectively. The results for quarter 0 are highly significant (with a one-tailed significance level of 0.000) for both models but in the opposite direction (significantly negative) of what was hypothesized.

Additional results of the time-series tests are presented in Table 8. The second two columns provide results using the Jones (1991) and modified Jones model for quarter 0. The mean and median unstandardized prediction errors for total accruals are significantly negative using the t-test and the nonparametric Wilcoxon test for both models. The first two and last two columns in Table 8 report the results of time-series tests for quarter -1 and quarter +1. Two-tailed significance tests were used in this analysis because specific hypotheses had not been generated for these periods. Both the standardized and unstandardized prediction errors for total accruals are significantly negative at $p<0.05$ (two-tailed) using the t-test and the nonparametric Wilcoxon test for both models. The magnitude of the unstandardized means range from -0.072 to -0.031. The unstandardized prediction errors are interpreted as abnormal accruals as a percentage of lagged total assets.

As stated previously, each firm was required to have a minimum of 12 quarterly observations from the period prior to the event period to estimate the parameters of the time-series models. In following with Shivakumar (1996), Table 9 reports the results of the time-series tests for only those firms with at least 20 time-series observations in the estimation period. The results are consistent with Table 8. The mean and median unstandardized prediction errors for total accruals in quarter 0 are significant using the t-test and the nonparametric Wilcoxon test for both versions of the Jones models, but in the opposite direction of what was hypothesized.

The first two and last two columns in Table 9 also report the results of time-series tests for quarter -1 and quarter +1. To remain consistent with Table 8, two-tailed significance tests were used in this analysis. The results in this Table stand in contrast to those in Table 8. The parametric *t-tests* on both the standardized and unstandardized prediction errors for total accruals are generally insignificant for quarter -1 and quarter +1, while the standardized and unstandardized prediction errors for total accruals are significantly negative at $p<0.05$ (two-tailed) in quarter -1 using the nonparametric Wilcoxon test.

Because it was clear that one-tailed significance tests in quarter 0 would not support the conventional theory of positive manipulation, two-tailed significance tests, along with one-tailed tests in the opposite direction were run to attain additional information on managers' behavior during periods of listing uncertainty. Both tests indicate that the mean and median unstandardized and standardized prediction errors for total accruals are significantly negative at $p<0.01$ using the t-test and the nonparametric Wilcoxon test for both models.

The hypothesis of income-increasing accruals manipulation in the period where the share price of the troubled firm drops below $1 is not supported using the time-series version of the Jones and modified version of the Jones Model. Based on this test, firms do not appear to use income-increasing accruals to maintain a listing on the NASDAQ National Market. A discussion of the possible reasons for this behavior is provided in Chapter 6. Section 5.3 reports on the reanalysis of the time-series tests for quarter 0 after attempting to control for outside factors that might bias against finding positive accrual manipulation.

Table 7

Individual Firm Standardized Prediction Errors (V_{jp}) and Related Test Statistics (Z_{vp}) from the Total Accruals Regression Models Estimated over the Period Prior to Quarter -1 using the Jones (1991) model

Firm Number	V_{jp}		
	Quarter -1	Quarter 0	Quarter +1
1	0.404	0.160	0.106
2	2.816	3.379	4.383
3	0.160	-0.290	-0.882
4	0.003	-0.189	0.238
5	-0.291	-0.864	0.470
6	-1.115	1.307	1.618
7	0.707	0.483	2.058
8	-3.534	0.309	0.423
9	0.044	-0.105	-0.530
10	0.645	0.313	0.359
11	-2.524	-2.831	-0.648
12	-0.970	-3.276	-6.870
13	-2.120	2.268	-0.505
14	-0.874	0.912	2.758
15	-4.344	-15.936	-30.465
16	0.357	-1.397	-2.281
17	-0.454	0.977	-0.811
18	-0.010	-1.210	0.319
19	3.488	3.698	-2.050
20	-0.207	-1.474	-0.255
21	-0.053	-0.651	-2.492
22	-0.967	0.425	0.120
23	-1.395	-1.730	-0.275
24	-1.322	0.442	0.291
25	-1.661	-2.538	0.449
26	0.321	-0.781	-0.350
27	-3.233	-5.709	-6.312
28	-1.246	-2.083	0.585
29	-0.188	-13.431	-1.791
30	-0.249	-0.662	-4.360
31	0.500	-3.592	-5.601
32	-0.029	-2.581	-3.249
33	0.579	0.477	0.383
34	-4.206	-6.633	-8.226
35	-4.239	-3.966	1.287
36	0.184	-0.950	0.845
37	-1.949	-2.329	-0.411

38	-1.978	-2.547	-2.008
39	-1.163	-2.024	0.147
40	-0.744	-1.260	-0.260
41	-1.489	-2.076	-0.646
42	-7.174	-9.922	0.219
43	0.264	-2.621	2.633
44	-4.080	-7.448	-13.761
45	1.373	1.974	1.850
46	1.111	0.107	0.236
47	0.471	0.157	0.060
48	-0.657	-0.993	-2.850
49	-0.577	-0.615	-1.290
50	0.472	-0.905	-1.239
51	-4.855	-6.215	-6.268
52	2.227	0.901	-1.876
53	3.449	0.765	-14.820
54	-3.289	-5.723	-9.874
55	0.054	0.001	-0.965
56	0.960	-0.721	-7.960
57	-2.361	-5.229	
58	-4.283	-8.578	-24.032
59	0.611	0.241	1.434
60	-3.239	-5.037	-0.158
61	-4.080	-6.366	-8.255
62	-1.155	-2.400	-0.556
63	-0.657	-1.560	-0.057
64	-1.217	-1.981	-2.245
65	0.971	0.076	-7.028
66	0.344	-1.960	0.693
67	-1.248	-2.259	-1.503
68	6.559	-1.835	-0.519
69	-0.391	0.268	-0.006
70	0.127	-0.297	0.386
71	0.814	0.856	0.738
72	-1.680	-2.983	0.453
73	-0.669	-1.228	2.366
74	0.488	-2.233	-1.103
75	0.448	-1.441	-9.884
76	-0.004	0.396	0.147
77	0.953	1.353	2.393
78	-2.873	-0.505	-2.489
79	-0.161	-0.523	0.558
80	-0.159	-0.281	0.970
81	-2.790	-2.058	-0.728
82	-2.297	-0.891	-3.819

83	0.085	-0.487	-1.561
84	2.273	-3.565	1.764
85	0.792	2.951	4.384
86	0.089	0.124	0.623
87	0.228	-0.867	-2.232
88	0.108	-1.017	-1.874
89	-5.187	-6.644	-8.659
90	-0.691	-2.365	-1.782
91	-2.395	-7.540	1.276
92	-0.766	-0.655	-1.684
93	2.333	5.959	0.783
94	-0.157	-0.817	-0.454
95	0.219	-0.088	-0.282
96	-0.186	-0.183	0.926
97	-1.454	-1.880	0.659
98	0.491	-0.161	-0.171
99	5.351	5.113	3.816
100	-0.285	-0.634	-1.200
101	0.195	-0.126	-4.391
102	0.926	0.907	-0.205
103	-1.650	3.919	0.190
104	-0.408	-0.485	-0.921
105	0.165	0.378	0.025
106	-2.217	1.609	4.354
107	-1.355	-1.696	-1.958
108	-0.300	-0.512	-0.474
109	0.888	0.298	0.159
110	-0.170	-2.716	2.723
111	-0.548	-1.069	-1.898
112	-0.417	-0.900	10.662
113	0.618	-0.887	0.158
114	1.498	0.712	0.142
115	-2.493	-5.797	-2.097
116	0.030	-1.999	-3.787
117	-1.281	-0.239	-0.168
118	-0.417	-1.604	-15.155
119	-1.156	-1.688	-0.236
120	1.821	1.715	-3.327
121	0.197	-0.190	-4.940
122	-4.793	-12.242	-27.375
123	-0.387	-1.492	0.108
124	0.738	1.299	0.168
125	-0.589	-0.650	2.339
126	-0.158	-1.171	-1.670
127	0.334	0.049	2.259

128	0.267	-34.457	1.289
129	-4.587	0.741	0.054
130	-0.839	-3.264	-1.041
131	-0.208	0.773	-0.737
132	1.215	-0.668	-0.828
133	-2.707	-2.417	-4.071
134	0.178	0.170	0.252
135	-0.621	-0.681	-1.267
136	2.082	0.501	0.174
137	4.316	-5.257	-0.999
138	0.539	0.361	0.022
139	-1.165	-0.926	-0.107
140	-1.686	-1.792	-2.042
141	-0.321	-0.689	-0.877
142	1.343	-1.154	-0.783
143	0.807	-0.024	-0.819
144	-4.227	-3.942	-0.579
145	-0.102	-2.259	1.413
146	0.448	-0.333	0.284
147	0.451	0.930	-0.598
148	0.408	-1.289	-2.803
149	0.019	0.184	0.193
150	-2.158	4.130	2.875
151	0.122	-0.550	-0.978
152	-0.290	-4.320	3.687
153	-0.555	-1.841	-0.294
154	-0.895	-2.921	1.975
155	-1.130	-0.683	2.572
156	-0.309	-0.770	-0.120
157	0.148	2.169	-1.048
158	-1.036	-5.087	0.618
159	-3.166	-5.769	0.515
160	-2.196	-4.872	0.528
161	-1.417	-3.551	-7.891
162	-0.130	0.123	0.972
163	2.570	4.407	3.499
164	0.497	-2.375	-0.908
165	0.104	-0.120	-0.205
166	0.917	-1.032	0.312
167	3.029	3.229	2.775
168	0.986	0.748	-0.862
169	-0.191	-0.402	-0.343
170	0.910	0.561	0.753
171	-0.064	-1.036	-1.928
172	-3.736	-4.367	-2.850

173	0.814	-4.026	-8.501
174	-0.131	-1.149	-2.279
175	5.219	2.504	3.930
176	-0.271	0.286	1.028
177	-4.667	0.658	-3.804
178	13.604	6.810	5.934
179	-0.061	-0.597	0.108
180	-3.510	-3.973	0.251
181	0.383	0.288	0.728
182	-0.650	-0.586	
183	0.164	-1.444	0.650
184	-1.525	-2.841	1.487
185	-0.378	-1.602	1.121
186	-0.656	-2.196	-0.154
187	-5.806	1.352	0.712
188	-0.540	-0.267	0.040
189	-2.175	0.165	0.249
190	0.759	-0.711	-7.179
191	-0.242	-0.389	0.437
192	-1.088	-0.937	-0.846
193	0.177	-0.039	-0.054
194	0.417	0.282	-0.020
195	0.481	0.248	0.452
196	-1.822	-2.048	-0.667
197	1.168	-0.730	1.192
198	-0.418	-0.435	-0.798
199	0.164	0.242	
200	-1.305	-8.181	1.336
201	-4.857	-6.662	-0.660
202	-0.896	-1.736	-2.537
203	3.025	2.498	-1.271
204	-1.189	-6.885	-0.985
205	-0.302	-4.293	0.805
206	-0.398	-1.153	0.277
207	0.077	0.942	1.003
208	-0.624	-0.092	1.790
209	6.068	5.420	-1.665
210	-1.809	-5.454	-0.481
211	-0.049	-0.820	0.474
212	0.687	0.881	0.455
213	2.981	-14.259	1.078
214	-0.206	-2.531	-4.688
215	-1.023	-1.557	-2.331
Z_{vp} statistic	**-2.74**	**-5.73**	**-3.99**

Table 8

Prediction errors in quarter -1, quarter 0, and quarter +1 from time-series model estimates of total accruals[d] using the Jones and Modified Jones Models for troubled NASDAQ National Market Firms in the period 1997-2001 (w/12 or more observations).

Panel A: Jones (1991) Model
Panel B: Modified Jones (1995) Model

Panel A	Quarter -1 prediction errors[a]		Quarter 0 prediction errors[a]		Quarter +1 prediction errors[a]	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Mean	-0.031	-0.388	-0.108	-1.478	-0.068	-1.166
Median	-0.020	-0.206	-0.073	-0.770	-0.012	-0.188
Standard deviation	0.195	2.165	0.240	3.811	0.333	4.445
Minimum	-0.859	-7.174	-1.359	-34.457	-2.345	-30.465
Maximum	1.236	13.604	0.801	6.810	2.051	10.662
t-statistic	-2.34	-2.63	-6.62	-5.69	-2.98	-3.82
Parametric p-value [b]	0.020	0.009	0.000	0.000	0.003	0.000
Nonparametric p-value [c]	0.000	0.001	0.000	0.000	0.003	0.002
No. of observations	215	215	215	215	212	212

Panel B	Quarter -1 prediction errors[a]		Quarter 0 prediction errors[a]		Quarter +1 prediction errors[a]	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Mean	-0.032	-0.408	-0.114	-1.489	-0.072	-1.224
Median	-0.018	-0.203	-0.077	-0.859	-0.018	-0.215
Standard deviation	0.204	2.181	0.235	3.810	0.334	4.466
Minimum	-0.929	-7.377	-1.460	-34.528	-2.393	-30.360
Maximum	1.248	13.736	0.622	6.843	2.053	10.668
t-statistic	-2.30	-2.74	-7.09	-5.73	-3.15	-3.99
Parametric p-value [b]	0.022	0.007	0.000	0.000	0.002	0.000
Nonparametric p-value [c]	0.000	0.000	0.000	0.000	0.001	0.001
No. of observations	215	215	215	215	212	212

Notes:
[a]The prediction errors are computed using time-series estimates of the following model of total accruals for quarters prior to the quarter preceding the period of listing uncertainty (t_{-1}):

$$\mathbf{TA_{jt}/AST_{jt-1} = \beta_{0j}[1/\ AST_{jt-1}] + \beta_{1j}[\Delta REV_{jt}\ /\ AST_{jt-1}] + \beta_{2j}[PPE_{jt}/AST_{jt-1}] + \varepsilon_{jt}}$$

Where TA_{jt}=total accruals for firm *j* in quarter *t*; AST_{jt-1} =total lagged assets for firm *j* in quarter *t-1;* ΔREV_{jt} = revenues for firm *j* in quarter *t* less revenues for quarter *t-1*; PPE_{jt} = gross property, plant, and equipment for firm *j* in quarter *t*; ε_{jt} = error term for firm *j* in quarter *t*, a residual term which captures all the impacts on TA_{jt} other than those from ΔREV_{jt} and PPE_{jt}; *j*=1,....215, firm index; *t*=1....T_j, time period (quarter) index for firm *j*'s estimation period; T_j ranges from 12 quarters to 43 quarters. The modified version of the Jones Model includes the ΔREC_{jt} in the prediction period and p is designated the quarter for which normal accruals are predicted as follows:

$$\mathbf{TA_{jp}/AST_{jp-1} - (b_{0j}[1/AST_{jp-1}] + b_{1j}\ [\Delta REV_{jp} - \Delta REC_{jt}\ /AST_{jp-1}] + b_{2j}\ [PPE_{jp}/AST_{jp-1}]).}$$

The unstandardized prediction errors are calculated as the differences between the predicted and reported accruals and the standardized prediction errors are scaled by the standard deviation of the error term.

[b] The parametric p-values for the unstandardized prediction errors are two-tailed tests for quarters -1 and +1, and one-tailed for quarter 0. Following Jones (1991), the parametric p-values for the standardized prediction errors are one-tailed tests for quarter 0 and two-tailed for quarters -1 and +1 and are derived from a Z_{vp} statistic. This statistic is calculated as $Z_{vp} = \sum V_{jp} / \sum [(T_j - k)/(T_j - (k+2))]^{1/2}$, where V_{jp} is the prediction error scaled by the standard deviation of the error term from the first model above, k is the model's degrees of freedom or number of parameter estimates in the model, T_j is the total number of quarterly time-series observations for firm j, and p is the prediction period (quarter). The unstandardized prediction errors are interpreted as a measure of the level of unexpected accruals as a percentage of total assets. The Z_{vp} statistic is presumed to be asymptotically distributed as a unit normal variate.

[c]The nonparametric p-values are one-tail Wilcoxon tests for quarter 0 and two-tailed for quarters -1 and +1.

[d]Total accruals are measured from quarterly COMPUSTAT data and defined as Item 76, Net income before extraordinary items and discontinued operations, minus Item 108, Cash Flow from Operations. This only includes time series data through SFAS 95.

Table 9

Prediction errors in quarter -1, quarter 0, and quarter +1 from time-series model estimates of total accruals[d] using the Jones and Modified Jones Models for troubled NASDAQ National Market Firms in the period 1997-2001 (w/20 or more observations).

Panel A: Jones (1991) Model
Panel B: Modified Jones (1995) Model

Panel A	Quarter -1 prediction errors[a]		Quarter 0 prediction errors[a]		Quarter +1 prediction errors[a]	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Mean	-0.014	-0.210	-0.086	-1.247	-0.019	-0.587
Median	-0.017	-0.160	-0.065	-0.675	-0.003	-0.037
Standard deviation	0.169	2.149	0.214	3.961	0.274	3.605
Minimum	-0.531	-5.806	-0.696	-34.457	-1.105	-27.375
Maximum	1.236	13.604	0.801	6.810	2.051	10.662
t-statistic	-1.01	-1.18	-4.83	-3.80	-0.82	-1.96
Parametric p-value [b]	0.315	0.239	0.000	0.000	0.416	0.052
Nonparametric p-value [c]	0.017	0.039	0.000	0.000	0.211	0.186
No. of observations	146	146	146	146	144	144

Panel B	Quarter -1 prediction errors[a]		Quarter 0 prediction errors[a]		Quarter +1 prediction errors[a]	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Mean	-0.014	-0.221	-0.092	-1.268	-0.021	-0.655
Median	-0.014	-0.125	-0.070	-0.650	-0.004	-0.081
Standard deviation	0.181	2.179	0.201	3.948	0.270	3.629
Minimum	-0.572	-5.807	-0.695	-34.528	-1.118	-27.705
Maximum	1.248	13.736	0.622	6.843	2.053	10.668
t-statistic	-0.93	-1.23	-5.56	-3.88	-0.95	-2.16
Parametric p-value [b]	0.352	0.222	0.000	0.000	0.344	0.032
Nonparametric p-value [c]	0.022	0.031	0.000	0.000	0.146	0.113
No. of observations	146	146	146	146	144	144

Notes:

[a]The prediction errors are computed using time-series estimates of the following model of total accruals for quarters prior to the quarter preceding the period of listing uncertainty (t_{-1}):

$$\mathbf{TA_{jt}/AST_{jt-1} = \beta_{0j}[1/\ AST_{jt-1}] + \beta_{1j}[\Delta REV_{jt}\ /\ AST_{jt-1}] + \beta_{2j}[PPE_{jt}/AST_{jt-1}] + \varepsilon_{jt}}$$

Where TA_{jt}=total accruals for firm *j* in quarter *t*; AST_{jt-1} =total lagged assets for firm *j* in quarter *t-1;* ΔREV_{jt} = revenues for firm *j* in quarter *t* less revenues for quarter *t-1*; PPE_{jt} = gross property, plant, and equipment for firm *j* in quarter *t*; ε_{jt} = error term for firm *j* in quarter *t*, a residual term which captures all the impacts on TA_{jt} other than those from ΔREV_{jt} and PPE_{jt}; *j*=1,....215, firm index; *t*=1....T_j, time period (quarter) index for firm *j*'s estimation period; T_j ranges from 12 quarters to 43 quarters. The modified version of the Jones Model includes the ΔREC_{jt} in the prediction period and p is designated the quarter for which normal accruals are predicted as follows:

$$\mathbf{TA_{jp}/AST_{jp-1} - (b_{0j}[1/AST_{jp-1}] + b_{1j}\ [\Delta REV_{jp} - \Delta REC_{jt}\ /AST_{jp-1}] + b_{2j}\ [PPE_{jp}/AST_{jp-1}]).}$$

The unstandardized prediction errors are calculated as the differences between the predicted and reported accruals and the standardized prediction errors are scaled by the standard deviation of the error term.

[b] The parametric p-values for the unstandardized prediction errors are two-tailed tests for quarters -1 and +1, and one-tailed for quarter 0. Following Jones (1991), the parametric p-values for the standardized prediction errors are one-tailed tests for quarter 0 and two-tailed for quarters -1 and +1 and are derived from a Z_{vp} statistic. This statistic is calculated as $Z_{vp} = \sum V_{jp} / \sum [(T_j - k)/(T_j - (k+2))]^{1/2}$, where V_{jp} is the prediction error scaled by the standard deviation of the error term from the first model above, k is the model's degrees of freedom or number of parameter estimates in the model, T_j is the total number of quarterly time-series observations for firm j, and p is the prediction period (quarter). The unstandardized prediction errors are interpreted as a measure of the level of unexpected accruals as a percentage of total assets. The Z_{vp} statistic is presumed to be asymptotically distributed as a unit normal variate.

[c]The nonparametric p-values are one-tail Wilcoxon tests for quarter 0 and two-tailed for quarters -1 and +1.

[d]Total accruals are measured from quarterly COMPUSTAT data and defined as Item 76, Net income before extraordinary items and discontinued operations, minus Item 108, Cash Flow from Operations. This only includes time series data through SFAS 95.

5.2.2 Cross-sectional Analysis

The cross-sectional analysis in this study follows the analysis presented in DeFond and Jiambalvo (1994) and Shivakumar (1996) in which the models were estimated using data matched on industry and quarter (time period). The estimation portfolios were composed of all COMPUSTAT firms with available data matched with the troubled NASDAQ National Market firms by quarter and two-digit SIC code. It was determined at the outset that matching on a finer level of SIC code classification would have limited the size of the estimation portfolios, thus reducing the power of the statistical tests.[56] The collection procedure resulted in a mean and median number of firms in each estimation portfolio of 166 and 86, respectively, with the largest portfolio containing 1329 firms (SIC 73: Business Services) and the smallest portfolio containing 13 firms (SIC 52: Building material, hardware, and garden retail). The 495 troubled firms are in 41 two-digit industries, and there are 122 unique industry/quarter combinations because a number of the estimation portfolios are used for multiple troubled firms.[57]

Similar to DeFond and Jiambalvo (1994), Table 10 compares the troubled (sample) firms with the firms in the estimation portfolios on the basis of total assets, earnings, revenue, and fair market value for the year when the troubled firm entered a period of listing uncertainly. The intent of this presentation is to ascertain whether the sample firms

[56] At least six firms were needed in each portfolio to have the minimum number of degrees of freedom to perform the statistical tests.

[57] Specifically, there were 41 instances in which the same estimation portfolio was used for two different troubled firms, 15 instances in which the same estimation portfolio was used for three different troubled firms, ten instances in which the same estimation portfolio was used for four different troubled firms, four instances in which the same estimation portfolio was used for five different troubled firms, three instances in which the same estimation portfolio was used for six different troubled firms, five instances in which the same estimation portfolio was used for seven different troubled firms, one instance in which the same estimation portfolio was used for nine different troubled firms, one instance in which the same estimation portfolio was used for ten different troubled firms, one instance in which the same estimation portfolio was used for 11 different troubled firms, one instance in which the same estimation portfolio was used for 17 different troubled firms, one instance in which the same estimation portfolio was used for 21 different troubled firms, one instance in which the same estimation portfolio was used for 24 different troubled firms, and one case in which the same estimation portfolio was used for 54 different troubled firms. The two-digit SIC codes 73 and 48 were the industries in which the majority of the heavy clustering was present.

are representative of the firms in the estimation portfolios. In the design of Table 10, the median value of each estimation portfolio was treated as a firm-observation. The mean level of each measure (assets, earnings, revenue, and FMV) for the estimation portfolio is the mean of the distribution composed of each estimation portfolio's median level of the specific measure (assets, earnings, revenue, and FMV). For each troubled firm, a paired difference score was calculated by subtracting from its measure of assets, earnings, revenue, or FMV the median value (of assets, earnings, revenue, or FMV) in the estimation portfolio.

The parametric paired sample t-tests and nonparametric Wilcoxon tests were performed to compare the troubled NASDAQ firms with the estimation portfolios. Panel 1 and panel 4 of Table 4 indicate that the mean and median total assets and FMV are statistically different across the two groups. Differences in assets and firm market value are significant at $p<0.001$ (two-tailed) for both t-tests and Wilcoxon tests. Panel 2 of Table 4 indicates that mean and median earnings (as a percentage of total assets) are negative for the troubled firms and positive for the estimation portfolios in the year in which the troubled firm enters a period of listing uncertainty. Differences in earnings are significant at $p<0.001$ (two-tailed) for both t-tests and Wilcoxon tests. Only 7% of the troubled firms exhibited positive earnings during the period of uncertainty, while 78% of the estimation firm medians were positive. Panel 3 of Table 4 indicates that the mean and median revenue (as a percentage of total assets) are not significantly different across the two groups. In summary, Table 4 indicates that, when troubled firms are compared to their respective industries during a period of listing uncertainty, the troubled firms are smaller in size and market value and less profitable than an estimation portfolio of their industrial counterpart. The significant difference in the percentage of firms with positive earnings casts doubt on whether the estimated cross-sectional models are representative of the

troubled NASDAQ firms. Table 11 reports the average number of firms in each estimation portfolio and the median value for assets, earnings, revenue, and market value for each SIC code classification.

Table 10

Assets, earnings, revenue, and FMV in year 0 (period of listing uncertainty) for 495 firms in jeopardy of delisting from the NASDAQ National Market and 495 estimation portfolios in the period 1997-2001

Panel 1: Assets			
	Troubled NASDAQ firms	*Estimation firms*[a]	*Paired differences*[b]
Mean	$ 94.78	$ 2,408.96	$ 2,314.180
Median	$ 34.80	$ 107.33	$ 74.270
Significance tests (two-tailed):[c]			
t-test			0.000
Wilcoxon test			0.000

Panel 2: Earnings[d]			
	Troubled NASDAQ firms	*Estimation firms*[a]	*Paired differences*[b]
Mean	-0.836	0.002	-0.8377
Median	-0.480	0.015	-0.452
Percent positive	6.97%	78.04%	2.89%
Significance tests (two-tailed):[c]			
t-test			0.000
Wilcoxon test			0.000

Panel 3: Revenue[e]			
	Troubled NASDAQ firms	*Estimation firms*[a]	*Paired differences*[b]
Mean	1.170	1.114	0.0561
Median	0.855	0.837	0.025
Significance tests (two-tailed):[c]			
t-test			0.419
Wilcoxon test			0.463

Panel 4: FMV[f]			
	Troubled NASDAQ firms	*Estimation firms*[a]	*Paired differences*[b]
Mean	$ 24.78	$ 2,447.52	$ (2,422.74)
Median	$ 13.73	$ 80.46	$ (67.78)
Significance tests (two-tailed):[c]			
t-test			0.000
Wilcoxon test			0.000

Notes:
(a) The estimation firm statistics are derived from the median values of each of 495 estimation portfolios. The portfolios are matched on year and two-digit SIC code of each troubled NASDAQ National Market firm. The mean and median portfolio size is 166 and 86 firms, respectively. The maximum portfolio contains 1323 firms and the minimum contains 13 firms.
(b) The paired differences are computed as the troubled firm value minus the median value from the matched portfolio. The amounts presented are the mean and median differences.
(c) Significance levels relate to tests of the null hypothesis that central tendency is zero.
(d) Earnings are scaled by total assets.
(e) Revenues are scaled by total assets.
(f) The FMV is calculated by multiplying the common shares O/S and the closing share price of the period.

Table 11

Assets, earnings, revenue, and FMV in year 0 (period of listing uncertainty) for 495 firms in jeopardy of delisting from the NASDAQ National Market in the period 1997-2001

Results by industry

SIC	Industry	*Average # firms in each portfolio*	*Assets Median*	*Earnings Median*	*Revenue Median*
10	Metal mining	86	75.67	-0.103	0.293
13	Oil and gas extraction	249	125.41	0.049	0.399
15	Building construction-general contr, op bldr	45	324.14	0.045	1.303
20	Food and kindred products	162	217.93	0.040	1.245
22	Textile mill products	32	356.39	-0.018	1.236
23	Apparel & other finished products	70	160.92	0.045	1.490
24	Lumber and wood products, ex furn	33	458.19	0.036	1.195
25	Furniture and fixtures	35	199.55	0.054	1.680
26	Paper and allied products	68	1,149.17	0.031	0.814
27	Printing, publishing, and allied	94	260.35	0.022	0.964
28	Chemicals & allied products	623	65.82	-0.119	0.424
30	Rubber & misc plastics products	84	110.72	0.015	1.193
31	Leather and leather products	21	91.73	0.032	1.556
34	Fabr metal, ex machinery, trans equipment	98	150.08	0.031	1.188
35	Industrial machinery and equipment	480	85.00	0.006	0.968
36	Electronic and other electrical equipment	601	120.29	0.015	0.847
37	Transportation equipment	132	289.29	0.033	1.118
38	Instruments and related products	470	38.10	0.001	0.835
39	Misc manufacturing industries	84	79.34	0.005	1.094
42	Motor freight transportation, warehousing	49	189.92	0.015	1.610
45	Transportation by air	45	648.58	0.017	1.049
48	Communications	370	743.94	-0.052	0.331
49	Electric, gas, sanitation services	212	2,255.57	0.027	0.463
50	Durable goods-wholesale	177	122.71	0.016	1.935
51	Nondurable goods-wholesale	105	104.90	0.020	1.735
52	Building material, hardware, garden-retail	15	362.23	0.007	2.139
54	Food stores	39	838.65	0.020	2.404
55	Auto dealers, gas stations	31	307.78	0.015	2.164
56	Apparel & accessory store	56	277.16	0.079	2.151
57	Home furniture and equipment store	29	235.04	0.062	2.004
58	Eating and drinking places	117	67.02	0.014	1.591
59	Miscellaneous retail	148	133.82	-0.019	1.817
62	Security & commodity brokers	99	261.61	0.013	0.501
72	Personal services	20	175.27	0.022	0.806
73	Business services	1323	62.06	-0.200	0.672
75	Auto repair, services, parking	17	1,022.31	0.004	0.626
78	Motion pictures	62	30.41	-0.199	0.584
79	Amusements, recreation	92	92.78	0.009	0.654
80	Health services	124	91.46	0.007	1.126
82	Educational services	29	95.23	-0.010	1.085
87	Engineering and management services	182	58.10	-0.053	0.786

For each troubled firm, six cross-sectional models were estimated using data from firms in its corresponding matched portfolio. The six models resulted from estimating two cross-sectional models (the cross-sectional version of Jones Model and the cross-sectional version of Modified Jones model) for quarters t_{-1}, t_0, and t_{+1} for total accruals. The following two cross-sectional models were used. Equation (3a) and (3b) are identical because the modified-Jones model uses the standard Jones model in the estimation period and then adds the adjustment in receivables in the prediction period.

$$\mathbf{TA_{i,t}/AST_{i,t-1} = \beta_0[1/\ AST_{i,t-1}] + \beta_1[\Delta REV_{i,t}/AST_{i,t-1}] + \beta_2[PPE_{i,t}/AST_{i,t-1}] + \varepsilon_{i,t}} \quad \textbf{(3a)}$$

$$\mathbf{TA_{i,t}/AST_{i,t-1} = \beta_0[1/\ AST_{i,t-1}] + \beta_1[\Delta REV_{i,t}/AST_{i,t-1}] + \beta_2[PPE_{i,t}/AST_{i,t-1}] + \varepsilon_{i,t}} \quad \textbf{(3b)}$$

where

$\mathbf{TA_{i,t}}$	=	total accruals for estimation portfolio firm i for quarter t,
$\mathbf{AST_{i,t-1}}$	=	total lagged assets for estimation portfolio firm i for quarter t,
$\mathbf{\Delta REV_{i,t}}$	=	change in revenues for estimation portfolio firm i for quarter t,
$\mathbf{\Delta REC_{i,t}}$	=	change in receivables for estimation portfolio firm i for quarter t,
$\mathbf{PPE_{i,t}}$	=	gross property, plant, and equipment for estimation portfolio firm i for quarter t,
$\boldsymbol{\varepsilon_{i,t}}$	=	error term for estimation portfolio firm i for quarter t,
$\boldsymbol{i}$	=	$1...I_j$, estimation firm index for the number of firms in the estimation portfolios (ranging from 13 to 1323 firms),
$\boldsymbol{t}$	=	prediction quarter(s) (for quarters t_{-1}, t_0, t_{+1}).

Ordinary least squares regression was used to obtain estimates b_0, b_1, b_2, of parameters β_0, β_1, and β_2 respectively, from equation (3). The parameters were used to compute both standardized and unstandardized prediction errors. Nondiscretionary total accruals (NDTA) were calculated as:

$$\mathbf{NDTA_{j,t} = b_0[1/AST_{j,t-1}] + b_1[\Delta REV_{j,t}/AST_{j,t-1}] + b_2[PPE_{j,t}/AST_{j,t-1}]} \quad \textbf{(4a)}$$

$$\mathbf{NDTA_{j,t} = b_0[1/AST_{j,t-1}] + b_1[\Delta REV_{j,t} - \Delta REC_{j,t}/AST_{j,t-1}] + b_2[PPE_{j,t}/AST_{j,t-1}]} \quad \textbf{(4b)}$$

where

$\mathbf{NDTA_{j,t}}$	=	total nondiscretionary accruals for troubled firm j for quarter t,
$\mathbf{AST_{j,t-1}}$	=	total lagged assets for troubled firm j for quarter t,
$\mathbf{\Delta REV_{j,t}}$	=	change in revenues for troubled firm j for quarter t,
$\mathbf{\Delta REC_{j,t}}$	=	change in receivables for troubled firm j for quarter t,
$\mathbf{PPE_{j,t}}$	=	gross property, plant, and equipment for troubled firm j for quarter t,
$\boldsymbol{j}$	=	1,.....N, troubled firm index,
$\boldsymbol{t}$	=	prediction quarter(s) (for quarters t_{-1}, t_0, t_{+1}).

Following Teoh, Welch, and Wong (1998a), discretionary total accruals (DTA) are represented by the residuals:

$$\mathbf{DTA_{j,t} = TA_{j,t}/AST_{j,t-1} - NDTA_{j,t}} \quad \textbf{(5a)}$$

$$\mathbf{DTA_{j,t} = TA_{j,t}/AST_{j,t-1} - NDTA_{j,t}} \quad \textbf{(5b)}$$

where

$\mathbf{DTA_{j,t}}$ = total discretionary accruals for troubled firm j for quarter t,
$\mathbf{AST_{j,t-1}}$ = total lagged assets for troubled firm j for quarter t,
$\mathbf{TA_{j,t}}$ = total accruals for troubled firm j for quarter t,
$\boldsymbol{j}$ = 1,.....N, troubled firm index,
$\boldsymbol{t}$ = prediction quarter(s) (for quarters t_{-1}, t_0, t_{+1}).

As indicated in Table 10 above, the current approach presented here does not fully control for the differences in economic circumstances between the troubled firms and estimation firms. The results obtained with the cross-sectional models are quite consistent with the results obtained using the time-series models however.

Similar to DeFond and Jiambalvo (1994), the tests of significance were conducted using both the standardized and unstandardized residuals from equation (5). The standardized prediction errors were computed as

$$\mathbf{V_{it} = DTA_{jt} / \sigma (\varepsilon_{i,t}),} \quad \textbf{(9)}$$

where $\sigma (\varepsilon_{i,t})$ represents the standard deviation of the error term from the cross-sectional model estimated for firm i. The parametric significance tests of the standardized prediction errors were computed as

$$\mathbf{Z_{vp} = \sum V_{jt} / \sum [(I_j - k)/(I_j - (k+2))]^{1/2},} \quad \textbf{(10)}$$

where k is the model's degrees of freedom, and I_j is the total number of firms in the estimation of portfolio for troubled firm j. The unstandardized prediction errors are interpreted as a measure of the level of unexpected accruals as a percentage of total assets.

Similar to the time-series models, the coefficient on the change in revenue was generally positive while the coefficient on property, plant, and equipment was generally negative. The magnitudes of the coefficients of each variable were comparable to the estimates obtained using the time-series models with one large distinction: the t-statistics for each of the variables was significantly greater under the cross-sectional tests. Under the time-series tests, the average t-statistic for the change in revenue was 1.333 and -0.618 for property, plant, and equipment, whereas under the cross-sectional models, the average t-statistic for the change in revenue was 5.85 and -6.71 for property, plant, and equipment. DeFond and Jiambalvo (1994) claim that "the t-statistics are likely to be overstated due to the downward biased standard error estimates expected in the presence of cross-sectional correlation."

Table 12 presents the results of the cross-sectional tests using the cross-sectional version of the Jones (1991) and modified Jones (1995) models. The parametric and nonparametric statistics for both the unstandardized and standardized prediction errors are presented. The second two columns provide results using the Jones (1991) and modified Jones model for quarter 0. As in the time series models, the mean and median unstandardized and standardized prediction errors (equation 9) for total accruals are significantly negative using the t-test and the nonparametric Wilcoxon test for both models.

The first two and last two columns in Table 12 report the results of cross-sectional tests for quarter -1 and quarter +1. Two-tailed significance tests were used in this analysis

because specific hypotheses had not been generated for these periods. Both the standardized and unstandardized prediction errors for total accruals are significantly negative at $p<0.01$ (two-tailed) using the t-test and the nonparametric Wilcoxon test for both models. The magnitudes of the unstandardized means range from -0.041 to -0.062. The unstandardized prediction errors are interpreted as abnormal accruals as a percentage of lagged total assets.

As in the time-series analysis, the hypothesis of income-increasing accruals manipulation in the quarter of listing uncertainty cannot be supported using the cross-sectional models. A discussion of the possible reasons for this behavior is included in Chapter 6. In the next section, the quarter zero (0) results are reanalyzed by controlling for factors that might bias against finding income-increasing manipulation including controls for firms with reverse-stock splits, going-concern qualifications/bankruptcy, dividend reductions, debt-covenant violations, and management changes.

Table 12

Prediction errors in quarter -1, quarter 0, and quarter +1 from cross-sectional estimates of total accruals[d] using the Jones and Modified Jones Models for troubled NASDAQ National Market Firms in the period 1997-2001.

Panel A: Jones (1991) Model
Panel B: Modified Jones (1995) Model

Panel A	Quarter -1 prediction errors[a]		Quarter 0 prediction errors[a]		Quarter +1 prediction errors[a]	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Mean	-0.041	-0.308	-0.096	-0.800	-0.061	-0.455
Median	-0.032	-0.276	-0.071	-0.418	-0.048	-0.371
Standard deviation	0.183	1.578	0.192	1.641	0.208	1.541
Minimum	-0.631	-3.778	-1.347	-8.419	-1.421	-8.937
Maximum	1.040	13.867	0.899	11.615	1.880	19.789
t-statistics	-3.73	-3.82	-6.46	-6.39	-4.02	-4.88
Parametric p-value [b]	0.000	0.000	0.000	0.000	0.000	0.000
Nonparametric p-value [c]	0.000	0.000	0.000	0.000	0.000	0.000
No. of observations	495	495	495	495	495	495

Panel B	Quarter -1 prediction errors[a]		Quarter 0 prediction errors[a]		Quarter +1 prediction errors[a]	
	Unstandardized	Standardized	Unstandardized	Standardized	Unstandardized	Standardized
Mean	-0.043	-0.312	-0.099	-0.854	-0.062	-0.465
Median	-0.034	-0.283	-0.074	-0.437	-0.051	-0.398
Standard deviation	0.188	1.664	0.194	1.687	0.214	1.609
Minimum	-0.717	-4.193	-1.352	-8.508	-1.483	-9.211
Maximum	1.068	14.833	0.931	12.753	1.891	20.333
t-statistic	-3.68	-3.88	-6.38	-6.34	-4.19	-4.93
Parametric p-value [b]	0.000	0.000	0.000	0.000	0.000	0.000
Nonparametric p-value [c]	0.000	0.000	0.000	0.000	0.000	0.000
No. of observations	495	495	495	495	495	495

Notes:

[a]The prediction errors are computed using cross-sectional estimates of the following model of total accruals for quarters prior to the quarter preceding the period of listing uncertainty (t_{-1}):

$$TA_{i,t}/AST_{i,t-1} = \beta_0[1/ AST_{i,t-1}] + \beta_1[\Delta REV_{i,t}/AST_{i,t-1}] + \beta_2[PPE_{i,t}/AST_{i,t-1}] + \varepsilon_{i,t}$$

Where $TA_{i,t}$ =total accruals for estimation portfolio firm i for quarter t; $AST_{i,t-1}$=total lagged assets for estimation portfolio firm i for quarter t; $\Delta REV_{i,t}$ =change in revenues for estimation portfolio firm i for quarter t; $\Delta REC_{i,t}$ =change in receivables for estimation portfolio firm i for quarter t; $PPE_{i,t}$ =gross property, plant, and equipment for estimation portfolio firm i for quarter t, $\varepsilon_{i,t}$ = error term for estimation portfolio firm i for quarter t; i =1...I_j, estimation firm index for the number of firms in the estimation portfolios (ranging from 13 to 1323 firms);t = prediction quarter(s) (for quarters t_{-1}, t_0, t_{+1}). The modified version of the Jones Model includes the ΔREC_{jt} in the prediction period for the modified version of the Jones model and j=1,.....495, troubled firm index, as follows:

$$TA_{j,t}/AST_{j,t-1} - (b_0[1/AST_{j,t-1}] + b_1[\Delta REV_{j,t} /AST_{j,t-1}] + b_2[PPE_{j,t}/AST_{j,t-1}]).$$

$$TA_{j,t}/AST_{j,t-1} - (b_0[1/AST_{j,t-1}] + b_1[\Delta REV_{j,t} - \Delta REC_{j,t} /AST_{j,t-1}] + b_2[PPE_{j,t}/AST_{j,t-1}]).$$

The unstandardized prediction errors are calculated as the differences between the predicted and reported accruals and the standardized prediction errors are scaled by the standard deviation of the error term. The unstandardized prediction errors are interpreted as a measure of the level of unexpected accruals as a percentage of total assets.

[b] The parametric p-values for the unstandardized prediction errors are two-tailed tests for quarters -1 and +1, and one-tailed for quarter 0. Similar to Jones (1991), the parametric p-values for the standardized prediction errors are one-tailed tests for quarter 0 and two-tailed for quarters -1 and +1 and are derived from a Z_{vp} statistic. This statistic is calculated as $Z_{vp} = \sum V_{jp} / \sum [(I_j - k)/(I_j - (k+2))]^{1/2}$, where V_{jp} is the prediction error for the troubled firm during prediction period scaled by the standard deviation of the error term from the model above, I_j is the total number of firms in the estimation portfolios for firm j, and p is the prediction period (quarter), and k is the number of parameter estimates in the model. The Z_{vp} statistic is presumed to be asymptotically distributed as a unit normal variate.

[c]The nonparametric p-values are one-tail Wilcoxon tests for quarter 0 and two-tailed for quarters -1 and +1.

[d]Total accruals are measured from quarterly COMPUSTAT data and defined as Item 76, Net income before extraordinary items and discontinued operations, minus Item 108, Cash Flow from Operations. This only includes time series data through SFAS 95.

5.3 Controlling for Reverse-Stock Splits, Going-Concern Qualifications/Bankruptcy, Dividend Reductions, and Management Changes in quarter 0

As discussed in Section 4.2.2.1, there are a number of factors that affect the use of discretionary accruals, and as such, these factors are likely to explain the finding of negative prediction errors in quarter 0. For example, if management elects to reverse split its stock or cut the firm's normal dividend during the sample period, an expectation might exist for management to "take a bath," as the effect of the reverse stock split or dividend reduction will likely exert downward pressure on firm value anyway. If a firm receives a going-concern opinion or files for bankruptcy, it is likely that the auditors would be more attentive and conservative in the audit work due to the looming possibility of litigation should the client go bankrupt. This limits the ability of management to use accrual manipulation. Finally, a number of researchers found a high incidence of managerial turnover within their sample of firms experiencing financial distress (DeAngelo, DeAngelo, and Skinner, 1994; DeAngelo ,1988; Murphy and Zimmerman, 1993) followed by the incoming management taking an earnings bath to create a new start. These factors are likely to explain a portion of the negative prediction errors during quarter 0, the period of listing uncertainty.

Data were gathered on each one of these factors and those firms were removed from the test to see if their inclusion affected the level of income-decreasing discretionary accrual reported in section 5.2. Reverse stock splits were gathered from on-line financial resources (e-analytics.com and investorguide.com). Dividend reductions were secured from examining COMPUSTAT quarterly item 89, Cash Dividends from the Statement of Cash Flows. Going-concern/bankrupt issues were examined using Lexis-Nexis and COMPUSTAT (Annual Item 149), which reports information on the specific auditor and audit opinion. Finally, changes in management were obtained using a keyword search in

Lexis-Nexis.[58] Any firm meeting one of the criteria was removed from the remainder of the search. This resulted in 60(162) being removed from the 215 (495) firms in the time-series (cross-sectional) analysis.

The time-series tests for accrual manipulation were performed for total accruals using both the Jones and modified version of the Jones Model. The results are presented in Table 13. The mean and median unstandardized and standardized prediction errors remain significantly negative, but the magnitude of the measure has significantly declined (from -0.108 to -0.084) in the time-series analysis and declined slightly in the cross-sectional analysis (from -0.097 to -0.087).

[58] Management change only included the removal of the CEO. The keyword search included the following terms: *Firm name, going-concern issue, chapter 11, bankruptcy, liquidation, CEO change, fired,* and *removal*.

Table 13

Prediction errors in quarter 0 from time-series and cross-sectional estimates of total accruals [e] using the Jones and Modified Jones Models for troubled NASDAQ National Market Firms in the period 1997-2001 excluding firms with reverse stock splits, going-concern qualifications/bankruptcy, dividend cuts, or management changes.

Panel A: Jones (1991) Model
Panel B: Modified Jones (1995) Model

Panel A	Time-series Model prediction errors [a]		Cross-sectional Model prediction errors [b]	
	Unstandardized	Standardized	Unstandardized	Standardized
Mean	-0.084	-1.136	-0.087	-0.716
Median	-0.067	-0.681	-0.068	-0.397
Standard deviation	0.181	2.633	0.178	1.546
Minimum	-0.540	-12.242	-1.347	-8.419
Maximum	0.619	6.810	0.796	8.844
t-statistic	-5.75	-5.37	-6.25	-6.01
Parametric p-value [c]	0.000	0.000	0.000	0.000
Nonparametric p-value [d]	0.000	0.000	0.000	0.000
No. of observations	155	155	333	333

Panel B	Time-series Model prediction errors [a]		Cross-sectional Model prediction errors [b]	
	Unstandardized	Standardized	Unstandardized	Standardized
Mean	-0.086	-1.134	-0.092	-0.818
Median	-0.072	-0.765	-0.072	-0.421
Standard deviation	0.183	2.626	0.188	1.591
Minimum	-0.622	-12.668	-1.352	-8.508
Maximum	0.622	6.843	0.890	10.229
t-statistic	-5.85	-5.38	-6.12	-5.92
Parametric p-value [c]	0.000	0.000	0.000	0.000
Nonparametric p-value [d]	0.000	0.000	0.000	0.000
No. of observations	155	155	333	333

Notes:

[a]The prediction errors are computed using time-series estimates of the following model of total accruals for quarters prior to the quarter preceding the period of listing uncertainty (t_{-1}):

$$TA_{jt}/AST_{jt-1} = \beta_{oj}[1/ AST_{jt-1}] + \beta_{1j}[\Delta REV_{jt} / AST_{jt-1}] + \beta_{2j}[PPE_{jt}/AST_{jt-1}] + \varepsilon_{jt}$$

Where TA_{jt}=total accruals for firm *j* in quarter *t*; AST_{jt-1} =total lagged assets for firm *j* in quarter *t-1;* ΔREV_{jt} =revenues for firm *j* in quarter *t* less revenues for quarter *t-1*; PPE_{jt} = gross property, plant, and equipment for firm *j* in quarter *t*; ε_{jt} = error term for firm *j* in quarter *t*, a residual term which captures all the impacts on TA_{jt} other than those from ΔREV_{jt} and PPE_{jt}; *j*=1,....155, firm index; *t*=1....T_j, time period (quarter) index for firm *j*'s estimation period; T_j ranges from 12 quarters to 43 quarters. The modified version of the Jones Model includes the ΔREC_{jt} in the prediction period and p is designated the quarter for which normal accruals are predicted as follows:

$$TA_{jp}/AST_{jp-1} - (b_{oj}[1/AST_{jp-1}] + b_{1j}[\Delta REV_{jp} - \Delta REC_{jt} /AST_{jp-1}] + b_{2j}[PPE_{jp}/AST_{jp-1}]).$$

The unstandardized prediction errors are calculated as the differences between the predicted and reported accruals and the standardized prediction errors are scaled by the standard deviation of the error term. The unstandardized prediction errors are interpreted as a measure of the level of unexpected accruals as a percentage of total assets.

[b]The prediction errors are computed using cross-sectional estimates of the following model of total accruals for quarters prior to the quarter preceding the period of listing uncertainty (t_{-1}):

$$TA_{i,t}/AST_{i,t-1} = \beta_0[1/ AST_{i,t-1}] + \beta_1[\Delta REV_{i,t}/AST_{i,t-1}] + \beta_2[PPE_{i,t}/AST_{i,t-1}] + \varepsilon_{i,t}$$

Where $TA_{i,t}$ =total accruals for estimation portfolio firm i for quarter t; $AST_{i,t-1}$=total lagged assets for estimation portfolio firm i for quarter t; $\Delta REV_{i,t}$ =change in revenues for estimation portfolio firm i for quarter t; $\Delta REC_{i,t}$ =change in receivables for estimation portfolio firm i for quarter t; $PPE_{i,t}$ =gross property, plant, and equipment for estimation portfolio firm i for quarter t, $\varepsilon_{i,t}$ = error term for estimation portfolio firm i for quarter t; *i* =1...I_j, estimation firm index for the number of firms in the estimation portfolios (ranging from 13 to 1323 firms);*t* = prediction quarter(s) (for quarters t_{-1}, t_0, t_{+1}). The modified version of the Jones Model includes the ΔREC_{jt} in the prediction period for the modified version of the Jones model and *j*=1,.....333, troubled firm index, as follows:

$$TA_{j,t}/AST_{j,t-1} - (b_0[1/AST_{j,t-1}] + b_1[\Delta REV_{j,t} /AST_{j,t-1}] + b_2[PPE_{j,t}/AST_{j,t-1}]).$$

$$TA_{j,t}/AST_{j,t-1} - (b_0[1/AST_{j,t-1}] + b_1[\Delta REV_{j,t} - \Delta REC_{j,t} /AST_{j,t-1}] + b_2[PPE_{j,t}/AST_{j,t-1}]).$$

The unstandardized prediction errors are calculated as the differences between the predicted and reported accruals and the standardized prediction errors are scaled by the standard deviation of the error term. The unstandardized prediction errors are interpreted as a measure of the level of unexpected accruals as a percentage of total assets.

[c]The parametric p-values for the unstandardized prediction errors are one-tailed. Similar to Jones (1991), the parametric p-values for the standardized prediction errors are one-tailed tests 0 and are derived from a Z_{vp} statistic.

[d]The nonparametric p-values are one-tail ed Wilcoxon tests.

[e]Total accruals are measured from quarterly COMPUSTAT data and defined as Item 76, Net income before extraordinary items and discontinued operations, minus Item 108, Cash Flow from Operations. This only includes time series data through SFAS 95.

Chapter 6: Contributions, Limitations, and Implications

This chapter begins with a review of the contributions that this dissertation provides to the existing literature on the use of earnings management by troubled firms. The limitations of the study are summarized in Section 6.2, followed by a discussion of the implications for future avenues of research.

6.1 Contributions

The purpose of this study was to investigate whether managers of troubled NASDAQ National Market® firms engaged in income-increasing earnings management in an attempt to influence short-term stock price performance in order to avoid delisting. It was thought that when information asymmetries exist between managers and outsiders, managers would engage in earnings management to influence the perceptions of capital markets, hoping this strategy would succeed in influencing investor perceptions, at least temporarily. The results, however, do not confirm that managers engage in this behavior, and similar to the results of DeAngelo, DeAngelo, and Skinner (1994), I found that managers' accounting choices primarily reflect their firms' financial difficulties, rather than attempts to inflate income through discretionary accruals.

The incentives to manage accounting earnings upward appeared to be quite strong for troubled firms, but these firms might have chosen not to manipulate earnings for a variety of reasons. Agency theory states that for earnings management to occur, the costs for investors to undo earnings management must exceed the costs of managing earnings (Watts and Zimmerman, 1986). It is quite possible that a number of the manager's of troubled firms considered the likelihood of earnings management being detected was too high and deferred to reporting results that correspond with their actual financial performance. Moreover, the practice of earnings management has several boundaries. Corporate audits required by securities regulators, investment banks, and stock exchanges provide a check on overly aggressive earnings management.

Unknown incentives might have compelled managers to engage in income-increasing accrual manipulation earlier in the firm's history. Given that accruals must eventually unwind, it is possible that this unraveling occurred contemporaneously with the period of exchange listing uncertainty.

This examination does contribute to the existing knowledge in this research domain by providing additional evidence on the accounting choices of troubled firms for capital market purposes, in that it employs a different definition of *troubled firm* as well as a different market event (jeopardy of delisting). The study, however, does not settle the question posed in prior studies: during periods of distress, do troubled firms engage in income-increasing or income-decreasing earnings management?

6.2 Limitations

Although the results from this study might prove useful to investors, analysts, firms, and accounting standard setters, several limitations are noted. Using a sample of

firms with reported losses (and dividend reductions), DeAngelo, DeAngelo, and Skinner (1994) found that "firms with net losses tend mechanically to be firms with low accruals, independent of managers' accounting choices." Sampling on the basis of low stock price, many of the firms that entered my sample were firms with reported losses, which might have biased against finding the anticipated results.

Because discretionary accruals (DA) are unobservable, a proxy for this measure is required. The results of my tests were based on the Jones (1991) and the modified version of the Jones (1991) model (DeChow, Sloan, and Sweeney, 1995), and as such, were dependent on this model for extracting the measure of discretionary accrual information. Some major deficiencies exist with the current accrual models. One obvious drawback is the inability to incorporate sufficiently the effect of changes in business fundamentals. Current models also do an inferior job of capturing how accruals are affected by a firm's stage in its life cycle. Accrual patterns in a growth phase are likely to be quite different from those occurring during periods of stability or decline. Another drawback relates to the power of the tests. Dechow, Sloan, and Sweeney (1995) found that the accrual-based models for detecting earnings management reject the null hypothesis of no earnings management at rates exceeding specified test-levels when applied to samples of firms with extreme (both over-performing and under-performing) financial performance. Based on the sample of troubled NASDAQ firms used in this study, my sample firms fall into the *extreme financial under-performing* group. As mentioned previously, accounting rules constrain accruals to reverse over time. As a result, if managers use reporting discretion opportunistically to increase earnings this period, their decision also affects future earnings as the accrual is reversed. Most accrual models do not reflect this relationship, which presumably increases the noise in estimates of discretionary accruals.

Because a large number of the firms listed on the NASDAQ National Market do not have the sufficient financial or reputational capital to be listed on the NYSE, and because the NYSE does not follow the same delisting rules as the NASDAQ, the results cannot be generalized to the other U.S. exchanges.

6.3 Implications for future research

The examination of earnings management around firm-specific events has received a great deal of attention from researchers. The focus of this study was to examine whether managers use accrual management to inflate earnings (or dampen losses) in an attempt to "signal" good news to the market. The results appear to suggest that managers do not use income-increasing accrual management to manipulate reported results, but instead report results consistent with their financial operations.

A number of more recent versions of the cross-sectional approach have been presented, including a model that matches on firm performance (Kothari, Leone, and Wasley, 2005). The model uses the cross-sectional version of the Jones (1991) model but matches on industry membership (two-digit SIC code) and firm performance (measured by return on assets, similar to Barber and Lyon, 1996). The results suggest that performance-matched discretionary accruals are well specified and powerful in detecting abnormal accruals under most conditions. The performance-matched discretionary accrual measures were found to be effective in mitigating type I errors (rejecting the null hypothesis when it is true) in cases where the researchers partitioning variable of interest is correlated with performance. The authors concede that this measure is not "the best measure in every conceivable setting" (Kothari, Leone, and Wasley, 2005). A definitive conclusion has not been reached about which cross-sectional approach is superior for measuring discretionary accruals. A review of recently published accounting literature and current working papers,

however, indicates that the performance matched approach suggested by Kothari, Leone, and Wasley (2005) and the matched portfolio method for adjusting abnormal accruals (by median industry) applied by Kasznik (1999) are used in the majority of papers using aggregate accruals models for detecting earnings management.

Finally, another promising alternative methodology for studying earnings management, introduced by Burgstahler and Dichev (1997) and Degeorge, Patel, and Zeckhauser (1999), investigates discontinuities in the distribution of reporting earnings around the thresholds of zero earnings, last year's earnings, and current year's analysts' expectations.

References

Accounting Principles Board (APB). 1971. *Accounting Changes, APB Opinion No. 20*. New York: American Institute of Certified Public Accountants.

Ahmed, A., K. Nainar, and J. Zhou. 2001. Do Analysts' Forecasts Fully Reflect the Information in Accruals?, Unpublished working paper, Syracuse University, Syracuse, NY.

Albrecht, W. and F. Richardson. 1990. Income Smoothing by Economy Sector. *Journal of Business Finance & Accounting* 17, 713- 730.

Arya, A., J. Clover, and S. Sunder. 2002. Are Unmanaged Earnings Always Better For Shareholders?. *Accounting Horizons* 17: 111-116.

Ball, R. and P. Brown. 1968. An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research* 6, 159-178.

Barber, B. and J. Lyon. 1996. Detecting Abnormal Operating Performance: The Empirical Power and Specification of Test Statistics. *Journal of Financial Economics* 41, 359-399.

Barnea, A., J. Ronen, and S. Sadan. 1976. Classificatory Smoothing of Income with Extraordinary Items. *The Accounting Review*, 110-122.

Beaver, W., R. Clarke and W. Wright. 1979. The Association between Unsystematic Security Returns and the Magnitude of Earnings Forecast Errors. *Journal of Accounting Research 17*, 316-340.

Beneish, M. 1997. Detecting GAAP Violation: Implications for Assessing Earnings Management Among Firms with Extreme Financial Performance. *Journal of Accounting and Public Policy 16*, 271-309.

Beneish, M. 2001. Earnings Management: A Perspective. *Managerial Finance* 27, 3-17.

Beneish, M., E. Press, and M. Vargus. 2001. The Relation between Incentives to Avoid Debt Covenant Default and Insider Trading. Unpublished working paper, University Of Indiana, Bloomington, IN.

Bessler, W. and T. Nohel. 1996. The Stock Market Reaction to Dividend Cuts and Omissions by Commercial Banks. *Journal of Banking and Finance* 20, 1485-1508.

Brown, S. and J. Warner. 1985. Using Daily Stock Returns: The Case of Event Studies. *Journal of Financial Economics* 14, 3-31.

Burgstahler, D. and I. Dichev, 1997. Earnings Management to Avoid Earnings Decreases and Losses, *Journal of Accounting and Economics* 24, (1).

Cahan, S. 1992. The Effect of Antitrust Investigations on Discretionary Accruals: A Refined Test of the Political-Cost Hypothesis. *The Accounting Review* 67, (1), 77-95.

Chambers, D. 2002. Earnings Management and Capital Market Misallocation. Unpublished working paper, University of Illinois, Urbana-Champaign, IL.

Chaney, P., D. Jeter and C. Lewis. 1998. The Use of Accruals in Income Smoothing: A Permanent Earnings Hypothesis. *Advances in Quantitative Analysis of Finance and Accounting* 6, 103-135.

Chen, K.C.W. and Schoderbek, M.P. 1999. The Role of Accounting Information in Security Exchange Delisting. *Journal of Accounting and Public Policy* 18, 31-57.

Collins, D.W., and P. Hribar. 2002. Errors in Estimating Accruals: Implications for Empirical Research, *Journal of Accounting Research* 40, 105-134.

Core, J., W. Guay, and A. Buskirk. 2003. Market Valuations in the New Economy: An Investigation of what has Changed. *Journal of Accounting and Economics* 34, (1-3), 43-67

DeAngelo, L. 1986. Accounting Numbers as Market Valuation Substitutes: A Study of Management Buyouts of Public Stockholders. *The Accounting Review* 67, 77-96.

DeAngelo, L. 1988. Managerial Competition, Information Costs, and Corporate Governance: The Use of Accounting Performance Measures in Proxy Contests. *Journal of Accounting and Economics* 10, 3-36.

DeAngelo, L. 1990. Equity Valuation and Corporate Control. *The Accounting Review*.65, 93-112.

DeAngelo, H., DeAngelo, L., and Skinner, D.J. 1994. Accounting Choice in Troubled Companies. *Journal of Accounting and Economics* 17, 113-143.

Dechow, P., 1994. Accounting Earnings and Cash Flows as Measures of Firm Performance. *Journal of Accounting and Economics* 18, 3-42.

Dechow, P., and Skinner, D.J. 2000. Earnings Management: Reconciling the Views of Accounting Academics, Practitioners, and Regulators. *Accounting Horizons* 14, 235-250.

Dechow, P., R. Sloan, and A. Sweeney. 1996. Causes and Consequences of Earnings Manipulation: An Analysis of Firms Subject to Enforcement Actions by the SEC. *Contemporary Accounting Research* 13, 1-36.

Dechow, P., R. Sloan, and A. Sweeney. 1995. Detecting Earnings Management. *The Accounting Review* 70, 193-225.

Dechow, P., J. Sabino, and R. Sloan. 1998. Implications of Nondiscretionary Accruals for Earnings Management and Market-Based Research. Unpublished Working Paper, University of Michigan, Ann Arbor, MI.

DeFond, M.L and C.W. Park. 1997. Smoothing Income in Anticipation of Future Earnings. *Journal of Accounting and Economics* 23, (2), 115-139.

DeFond, M.L and Jiambalvo, J. 1994. Debt Covenant Effects and the Manipulation of Accruals. *Journal of Accounting and Economics* 17, 145-176.

DeFond, M.L and K. Subramanyam. 1998. Auditor Changes and Discretionary Accruals. *Journal of Accounting and Economics* 25, 35-67.

Degeorge, F., J. Patel and R. Zeckhauser. 1999. Earnings Management to Exceed Thresholds. *Journal of Business* 72, 1-33.

Desai, H. and P. Jain. 1997. Long-Run Common Stock Returns Following Stock Splits and Reverse Splits. *Journal of Business* 70, 409-433.

Dye, R. 1988, Earnings Management in an Overlapping Generations Model. *Journal of Accounting Research* 26, 195-235.

Erickson, M. and S.Wang. 1999. Earnings Management by Acquiring Firms in Stock for Stock Mergers. *Journal of Accounting and Economics* 27, No 2, 149-177.

Financial Accounting Standards Board. 1987. *Statement of Financial Accounting Standard No. 95: Statement of Cash Flows*. Norwalk, Connecticut: Financial Accounting Standards Board.

Foster, G. 1977. Quarterly Accounting Data: Time-series Properties and Predictive Ability Results. *The Accounting Review* 52, 1-21.

Gilson, S.C. and M.R. Vetsuypens. 1993. CEO Compensation in Financially Distressed Firms: An Empirical Analysis. *Journal of Finance*, 48, (2), 425-458.

Grammatikos,T. and Papaioannou, G.J. 1986a. Market Reaction to NYSE Listings: Tests of the Marketability Gains Hypothesis. *The Journal of Financial Research* 9,(3), 215-227.

Grammatikos,T. and Papaioannou, G.J. 1986b. The Informational Value of Listing on the New York Stock Exchange. *The Financial Review* 21, 485-499.

Guay, W.A., Kothari, S.P. and Watts, R.L. 1996. A Market-Based Evaluation of Discretionary-Accrual Models. *Journal of Accounting Research* 34 (Supp), 83-105.

Guenther, D. 1994. Earnings Management in Response to Corporate Tax Rate Changes: Evidence from the 1986 Tax Reform Act. *The Accounting Review* 69, (1) 230-243.

Han, J. and S. Wang. 1998. Political Costs and Earnings Management of Oil Companies during the 1990 Persian Gulf Crisis. *The Accounting Review* 73, 103-117.

Hand, J. 2000. Profits, Losses and the Non-Linear Pricing of Internet Stocks, Working Paper, University of North Carolina- Chapel Hill, NC.

Hand, J. 2003. The Role of Economic Fundamentals, Web Traffic, and Supply and Demand in the Pricing of U.S. Internet Stocks. *European Finance Review* (forthcoming).

Healy, P.M. 1985. The Effect of Bonus Schemes on Accounting Decisions. *Journal of Accounting and Economics* 7, 85-107.

Healy, P. and J.M. Wahlen. 1999. A Review of the Earnings Management Literature and its Implications for Standard Setting. *Accounting Horizons* 13, 365-383.

Holthausen, R. 1981. Evidence on the Effect of Bond Covenants and Management Compensation Contracts on the Choice of Accounting Techniques: The Case of the Depreciation Switch-Back. *Journal of Accounting and Economics*, 3, 73-110.

Holthausen, R. 1990. Accounting Method Choice: Opportunistic Behavior, Efficient Contracting and Information Perspectives. *Journal of Accounting and Economics* 12, 207-218.

Holthausen, R., and Leftwich, R. 1983. The Economic Consequences of Accounting Choice. *Journal of Accounting and Economics* 5, (2): 77-117.

Jeter, D. and L. Shivakumar. 1999. Cross-sectional Estimation of Abnormal Accruals using Quarterly and Annual Data: Effectiveness in Detecting Event-specific Earnings Management. *Accounting and Business Research* 29, 299-319.

Jones, J. 1991. Earnings Management during Import Relief Investigation. *Journal of Accounting Research* 29, 193-228.

Kasznik, R. 1999. On the Association between Voluntary Disclosure and Earnings Management. *Journal of Accounting Research* 37, 57-81.

Kmenta, J. 1971. Elements of Econometrics. (MacMillan, New York, NY).

Kothari, S., Leone, A., and C. Wasley. 2005. Performance Matched Discretionary Accrual Measures, Journal of Accounting & Economics 39, No. 1, forthcoming.

Krantz, M. and G. Strauss. 2001. Troubled Firms Try Reverse Stock Splits. *USA Today*. February 14, 2001, Section B, 1-2.

Kreutzfeldt, R. and W. Wallace. 1986. Error Characteristics in Audit Populations: Their Profile and Relationship to Environmental Factors. *Auditing: A Journal of Practice and Theory* 6, 20-43.

Liberty, S.E. and J.L. Zimmerman. 1986. Labor Union Contract Negotiations and Accounting Choice. *The Accounting Review*, 692-712.

Levitt, A. 1998. The Numbers Game. Securities and Exchange Commission, Remarks by Chair Arthur Levitt at New York University Center of Law and Business (September 28) http://www.sec.gov/news/speech/speecharchive/1998/spch220.txt

Loomis, C.J. 1999. Lies, Damned Lies, and Managed Earnings: The Crackdown is Here. *Fortune*, August 2, 75-92.

Masse, I.,Hanrahan, J.R., and J. Kushner. 1997. The effect of Canadian stick splits, Stock Dividends, and Reverse Stock Splits on the Value of the firm. Quarterly Journal of Business and Economics 36, 51-62.

Mautz, R.D. Jr., and F.M. Richardson. 1992. Employer Financial Information and Wage Bargaining: Issues and Evidence. *Labor Studies Journal 17 (3) 35-52*.

McNichols, M. 2000. Research design Issues in Earnings Management Studies. *Journal of Accounting and Public Policy* 19, 313-345.

McNichols, M. and Wilson, P. 1988. Evidence of Earnings Management from the Provision for Bad Debts. *Journal of Accounting Research* 26 (Supp), 1-31.

Moyer, S.E. 1990. Capital Adequacy Ratio Regulations and Accounting Choices in Commercial Banks. *Journal of Accounting and Economics* 13, 123-154.

Murphy, K. and J. Zimmerman. 1993. Financial Performance Surrounding CEO Turnover. *Journal of Accounting and Economics 16*, 273-315.

OTC Bulletin Board Eligibility Rule: SEC Adopting Release 34-40878, printed in the Federal Register, January 8, 1999

Ou, J., and S. Penman. 1989. Financial Statement Analysis and the Prediction of Stock Returns. *Journal of Accounting and Economics* 11, 295-329.

Patell, J. 1976. Corporate Forecasts of Earnings per Share and Stock Price Behavior: Empirical Tests. *Journal of Accounting Research* 14, 246-276

Peasnell, K., Pope, P., and S. Young. 2000. Detecting Earnings Management using Cross-sectional Abnormal Accruals Models. *Accounting and Business Research* 30, 313-326.

Perry, S. and T. Williams. 1994. Earnings Management Preceding Management Buyout Offers. *Journal of Accounting and Economics* 18, 157-179.

Peterson, D.R. and P.P. Peterson. 1992. A Further Understanding of Stock Distributions: The Case of Reverse Stock Splits. *Journal of Financial Research* 15, 198-205.

Petroni, K.R. 1992. Optimistic Reporting in the Property-Casualty Insurance Industry. *Journal of Accounting and Economics* 15, 485-508.

Pourciau, S. 1993. Earnings Management and Nonroutine Executive Changes. *Journal of Accounting and Economics* 16, 317-336.

Rangan, S. 1998. Earnings Management and the Performance of Seasoned Equity Offerings. *Journal of Financial Economics* 50, 101-122.

Regulatory Requirements: The NASDAQ Stock Market http://www.nasdaq.com/about/RegRequirements.stm and http://www.nasdaqnews.com/asp/docs/Q01-508_listing_req_fees.pdf and http://www.nasdaq.com/about/MarketplaceRules.pdf

Richardson, S., I. Tuna, and M. Wu. 2003. Predicting Earnings Management: The Case of Earnings Restatements. Unpublished working paper, University of Pennsylvania, Philadelphia, PA.

Richardson, S., Sloan, R., Soliman, M. and I. Tuna. 2002. Information in Accruals about Earnings Persistence and Future Stock Returns. Unpublished working paper, University of Pennsylvania, Philadelphia, PA.

Sanger, G.C. and McConnell, J.J. 1986. Stock Exchange Listings, Firm Value, and Security Market Efficiency: The Impact of NASDAQ. *Journal of Financial and Quantitative Analysis* 21, 1-25.

Sanger, G.C. and Peterson, J. 1990. An Empirical Analysis of Common Stock Delistings. *Journal of Financial and Quantitative Analysis* 25, 261-272.

Schipper, K. 1989. Commentary on Earnings Management. *Accounting Horizons,* 91-99.

Shivakumar, L. 1996. Essays Related to Equity Offerings and Earnings Management. Dissertation, Vanderbilt University. Nashville, TN.

Shivakumar, L. 2000. Do Firms Mislead Investors by Overstating Earnings Around Seasoned Equity Offerings? *Journal of Accounting and Economics* 29, 339-371.

Shumway, T. 1997. The Delisting Bias in CRSP Data. *Journal of Finance* 52, (1), 327-340.

Sloan, R. 1996. Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings? *The Accounting Review* 71, 289-316.

Spudeck, R.E. and R.C. Moyer. 1985. Reverse Splits and Shareholder Wealth: The Impact of Commissions. *Financial Management* 14, 52-56.

Stice, J. 1991. Using Financial and Market Information to Identify Pre-Engagement Factors Associated With Lawsuits against Auditors. *The Accounting Review* 66, 516-534.

Subramanyam, K.R. 1996. The Pricing of Discretionary Accruals. *Journal of Accounting and Economics* 22, (2), 250-281.

Sutton, T. 1988. The Proposed Introduction of Current Cost Accounting in the UK: Determinants of Corporate Preference. *Journal of Accounting and Economics* 10, (2) 127-149.

Sweeney, A.P. 1994. Debt-Covenant Violations and Managers' Accounting Responses. *Journal of Accounting and Economics*, 281-308.

Teoh, S., I. Welch and T. Wong. 1998a. Earnings Management and the Long-Run Underperformance of Seasoned Equity Offerings. *Journal of Financial Economics* 50, 53-100.

Teoh, S., I. Welch and T. Wong. 1998b. Earnings Management and the Subsequent Market Performance of Initial Public Offerings. *Journal of Finance* 53, No.6.

Teoh, S., T.J. Wong, and G.Rao. 1998. Are Accruals During Initial Public Offerings Opportunistic? *Review of Accounting Studies* 3, 175-208.

Thomas, J. and X. Jhang. 2000. Identifying Unexpected Accruals: A Comparison of Current Approaches. *Journal of Accounting and Public Policy* 19, 347-376.

Trueman, B. and S. Titman. 1988. An Explanation for Accounting Income Smoothing. *Journal of Accounting Research* 26 (Supp), 127-139.

U.S. Securities and Exchange Commission, 2002. Press Releases on the Sarbanes-Oxley Act of 2002, (a.k.a. *Public Company Accounting Reform and Investor Protection Act of 2002*) http://www.sec.gov/spotlight/sarbanes-oxley.htm

Watts, R. and J. Zimmerman. 1990. Positive Accounting Theory: A Ten-Year Perspective. *The Accounting Review* 65, 131-156.

Watts, R. and J. Zimmerman. 1986. Positive Accounting Theory (Prentice Hall, Englewood Cliffs, NJ).

Watts, R. and J. Zimmerman. 1978. Towards a Positive Theory of the Determination of Accounting Standards. *The Accounting Review* 53, No.1, 12-134.

Wong, J. 1988. Political Costs and an Intraperiod Accounting Choice for Export Tax Credits. *Journal of Accounting and Economics* 10, No. 1, 37-51.

Ying, L., Lewellen, W., Schlarbaum, G., and Lease, R. 1977. Stock Exchange Listings and Securities Returns. *Journal of Financial and Quantitative Analysis* 12, 415-432.

Appendix A
NASDAQ National Market Financial Listing Requirements

Companies that choose to list their securities on The NASDAQ Stock Market ® must meet minimum initial and continued inclusion financial requirements.

A company must meet all of the requirements under at least one of three listing standards for initial listing on The NASDAQ National Market ®. A company must continue to meet at least one continued listing standard to maintain its listing.

Requirements	Initial Listing			Continued Listing	
	Standard 1 Marketplace Rule 4420 (a)	**Standard 2 Marketplace Rule 4420 (b)**	**Standard 3 Marketplace Rule 4420 (c)**	**Standard 1 Marketplace Rule 4450 (a)**	**Standard 2 Marketplace Rule 4450 (b)**
Stockholders' Equity	$15 million	$30 million	N/A	$10 million	N/A
Market Value of listed securities or Total assets and Total revenue	N/A	N/A	$75 million [a,b] or $75 million and $75 million	N/A	$50 million or $50 million and $50 million
Income from continuing operations before income taxes (in latest fiscal year or 2 of last 3 fiscal years)	$1 million	N/A	N/A	N/A	N/A
Publicly held shares [c]	1.1 million	1.1 million	1.1 million	750,000	1.1 million
Market value of publicly held shares	$8 million	$18 million	$20 million	$5 million	$15 million
Minimum bid price	$5	$5	$5	$1	$3
Shareholders (round lot holders) [d]	400	400	400	400	400
Market makers [e]	3	3	4	2	4
Operating history	N/A	2 years	N/A	N/A	N/A
Corporate governance [f]	Yes	Yes	Yes	Yes	Yes

[a] For listing under Standard 3, a company must satisfy one of the following: the market value of listed securities requirement or the total assets and the total revenue requirement. Under Marketplace Rule 4200(a)(19), listed securities is defines as "securities quoted on NASDAQ or listed on a national securities exchange".

[b] Seasoned companies (those already listed or quoted on another marketplace) qualifying only under the market value of listed securities requirement of Standard 3 must meet the market value of listed securities and the bid price requirement for 90 consecutive trading days prior to applying for listing.

[c] Publicly held shares is defines as total shares outstanding less any shares held by officers, directors, or beneficial owners of 10% or more.

[d] Round lot holders are shareholders of 100 shares or more.

[e] An *Electronic Communications Network* (ECN) is not considered a market maker for the purpose of these rules.

[f] Marketplace Rules 4350 and 4351.

Appendix B
Sample Firms from the NASDAQ National Market
Time-Series and Cross-Sectional Firms (215 firms)

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
2553340	12758	1439	ECOL	AMERICAN ECOLOGY CORP	
58493110	69542	1884	MDKI	MEDICORE INC	
14452510	15991	1902	CARN	CARRINGTON LABORATORIES INC	
63581210	17946	2204	3NEGI	NATIONAL ENERGY GROUP INC	11/9/1998
59507310	18308	2251	3MFIC	MICROFLUIDICS INTERNATIONAL CORP	4/22/1999
14688110	86431	2800	3CAVR	CARVER CORP WA	9/8/1998
20033230	25073	3229	CMDL	COMDIAL CORP	8/6/2002
74622C10	25786	3311	PURW	PURE WORLD INC	
22856910	27802	3625	3CRCE	CROWN RESOURCE CORP WA	10/20/2000
69182940	29744	3691	3OXIS	O X I S INTERNATIONAL INC	5/16/2001
28586110	87549	4292	3ETCIA	ELECTRONIC TELE COMMUNICATIONS	7/10/2001
29474910	33420	4434	EQTY	EQUITY OIL CO	
26788810	33823	4497	BOOM	DYNAMIC MATERIALS CORP	
44862310	42981	5798	HYBD	HYCOR BIOMEDICAL INC	
45890340	44928	6054	3IFSC	INTERFERON SCIENCES INC	4/13/1999
45982420	45509	6125	3ITSI	INTERNATIONAL LOTTERY & T S INC	12/16/1998
45811H10	52282	7192	3INVI	INTEGRAL VISION INC	8/15/2001
60219110	90211	7416	MILT	MILTOPE GROUP INC	
64127C10	54341	7430	NCEM	NEVADA CHEMICALS INC	
92335110	90310	7576	3VERA	VERAMARK TECHNOLOGIES INC	6/5/2002
29409K60	10062	7967	3ENSO	ENVIROSOURCE INC	9/1/1999
86270130	80378	8084	STRD	STRATEGIC DISTRIBUTION INC	
68555930	59871	8176	ORBT	ORBIT INTERNATIONAL CORP	
44913S10	60354	8234	HYPR	HYPERFEED TECHNOLOGIES INC	
69915710	61218	8341	PLLL	PARALLEL PETROLEUM CORP DE	
71660030	77799	8514	HEAT	PETROLEUM HEAT & POWER CO INC	
6.9361E+14	62790	8562	PSCX	P S C INC	8/20/2002
74462710	86521	8811	CARD	PUBLICARD INC	
80589410	69033	9443	3SOCR	SCAN OPTICS INC	11/9/2000
87156610	73956	10237	3SBIO	SYNBIOTICS CORP	5/29/2001
26792760	75548	10458	DHTI	DYNAMIC HEALTHCARE TECH INC	
89590610	45647	10724	3TRDXQ	TRIDEX CORP	5/2/2000
91390040	76472	11031	UNIV	UNIVERSAL INTERNATIONAL INC	
29014310	81219	11218	3ELOT	ELOT INC	7/31/2001
98490310	83863	11646	XICO	XICOR INC	
00208K10	10039	11948	3ATCME	AT COMM CORP	6/26/2001
75158K20	88592	12077	RYOU	RAMSAY YOUTH SERVICES INC	
25146410	10177	12192	DMCO	DETWILER MITCHELL & CO	
84890720	85845	12222	SGDE	SPORTSMANS GUIDE INC	

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
23282430	10383	12274	CYTO	CYTOGEN CORP	
21220C10	81257	12648	3CONC	CONTOUR ENERGY CO	8/30/1999
23765420	83252	12730	DDIM	DATA DIMENSIONS INC	
23282830	10838	13184	CYTR	CYTRX CORP	
50045310	11365	13369	3KMAGQ	KOMAG INC	8/23/2001
13200N10	77336	14077	CBJ	CAMBIO INC	10/20/1998
70644410	11306	14638	PAGI	PEMCO AVIATION GROUP INC	
81725310	75581	14810	3SCII	SENSAR CORP	4/10/2001
58984930	12260	14895	MSEL	MERISEL INC	
37246110	12174	15160	GGNS	GENUS INC	
91690130	75672	15240	3URIX	URANIUM RESOURCES INC	3/23/1999
43739T10	84739	15265	3HMLD	HOMELAND HOLDING CORP	5/3/2001
26150J10	78712	15752	DRAX	DRAXIS HEALTH INC	
30061510	75834	16729	EXBT	EXABYTE CORP	
65333G10	75835	16795	NEXT	NEXTHEALTH INC	
74280710	75859	17107	3PRCY	PROCYTE CORP	3/24/1999
75120310	75833	17137	RLLY	RALLYS HAMBURGERS INC	
86881920	75822	17232	SLTI	SURGICAL LASER TECHS INC	
51808110	75866	18100	LSCP	LASERSCOPE	
37365410	75710	18553	GOTK10	GEOTEK COMMUNICATIONS INC	6/30/1998
87951610	79877	19438	3TSCN	TELESCAN INC	9/25/2001
74591310	76080	20903	PLPT	PULSEPOINT COMMUNICATIONS	
2461110	76295	21505	3MABAA	AMERICAN BIOGENETIC SCIENCES INC	11/26/2001
45669610	85377	21663	3IAIC	INFORMATION ANALYSIS INC	7/27/1999
62938T10	76200	22263	NSCC	N S C CORPORATION	
53224410	76510	22404	3LROD	LIGHTNING ROD SOFTWARE INC	7/31/2001
65332H20	76457	22837	NEXL	NEXELL THERAPEUTICS INC NEW	8/30/2002
92832C10	76408	22980	3VSNA	VISIONAMERICA INC	6/28/2000
92336620	76430	23135	3VERD	VERDANT BRANDS INC	9/8/2000
45043010	76543	23499	3ITEQ	ITEQ INC	9/6/2000
67097410	76964	23968	3NVUE	NVIEW CORP	1/13/1999
59139810	76947	24100	3META	METATEC INTERNATIONAL INC	4/25/2002
13242610	76692	24106	3CNSI	CAMBRIDGE NEUROSCIENCE INC	1/21/1999
02744X10	76701	24185	ADLI	AMERICAN MEDICAL TECHNOLOGIES IN	
87233R10	76740	24315	TCSI	T C S I CORP	
15116730	76908	24376	CTSC	CELLULAR TECHNICAL SVCS CO INC	
53802920	76790	24398	3LSKI	LIUSKI INTERNATIONAL INC	1/13/1999
33771910	76793	24402	FIMG	FISCHER IMAGING CORP	
69554210	77038	24510	PAGE10	PAGING NETWORK INC	7/14/2000
3460210	77020	24535	ANRG	ANERGEN INC	
2664910	77098	24668	3AHOM	AMERICAN HOMEPATIENT INC	9/1/1999
16280930	77095	24671	CHKR	CHECKERS DRIVE IN RSTRNTS INC	
14170630	77323	24707	3CMDCQ	CAREMATRIX CORPORATION	11/9/2000
51792410	77230	24712	LASE	LASERSIGHT INC	

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
46091810	77223	24751	3IVBK	INTERVISUAL BOOKS INC	8/10/2001
92490710	77169	24767	VRTL	VERTEL CORP	8/21/2002
17118810	77170	24768	CRLS	CHRYSALIS INTERNATIONAL CORP	
36867G10	77171	24771	GENR	GENAERA CORP	
37245M20	77180	24781	GNTA	GENTA INC	
87263610	77184	24792	TRMM	T R M COPY CENTERS CORP	
38724110	77261	24840	GBTVK	GRANITE BROADCASTING CORP	
8.7306E+14	77262	24841	TTES	T 3 ENERGY SERVICES INC	
3234610	77264	24843	AMLN	AMYLIN PHARMACEUTICALS INC	
45764D10	77266	24845	IDYN	INNERDYNE INC	
71940F10	77276	24858	3PHYCQ	PHYCOR INC	8/24/2000
59159Q10	77340	24922	MTEK	METRETEK TECHNOLOGIES INC	10/14/2002
80862K10	77413	25047	SCLN	SCICLONE PHARMACEUTICALS INC	
44924610	77483	25053	3ICGXQ	I C G COMMUNICATIONS INC	11/14/2000
68394810	77517	25168	OPTN	OPTION CARE INC	
45814710	79147	25194	3FILM	INTELEFILM CORP	8/17/2001
89469230	77587	25225	TREV	TREEV INC	
62947810	77919	25748	3NXWXQ	NX NETWORKS INC	10/30/2001
48213330	77968	25779	3JUST	JUST TOYS INC	10/29/1998
29426L10	78008	25859	EPIC	EPICOR SOFTWARE CORP	
22051J30	78846	25993	CRTQ	CORTECH INC	
5277610	78812	26898	AIMM	AUTOIMMUNE INC	
36194210	80391	27701	3GSTXQ	G S T TELECOMMUNICATIONS INC	5/16/2000
81931910	78839	27756	3SHPH	SHAMAN PHARMACEUTICALS INC	2/1/1999
19126320	78817	27761	3COCN	COCENSYS INC	7/13/1999
15640W10	78890	27788	3MBNEQ	CENTURA SOFTWARE CORP	8/21/2001
45769X10	78869	27873	3INPM	INPRIMIS INC	10/25/2001
75952R10	79065	27906	RELV	RELIV INTERNATIONAL INC	
29251Q10	78965	27927	ENBC	ENCHIRA BIOTECHNOLOGY CORP	10/21/2002
84281410	79008	27930	SEHI	SOUTHERN ENERGY HOMES INC	
89612110	79016	27969	TRCD	TRICORD SYSTEMS INC	8/5/2002
58960110	78998	28010	MDCD	MERIDIAN DATA INC	
82655N10	79023	28020	3VISN	SIGHT RESOURCE CORP	9/8/2000
75190730	78910	28206	RMTR	RAMTRON INTERNATIONAL CORP	
3525510	79150	28209	ANIK	ANIKA THERAPEUTICS INC	
23321D10	79160	28276	3DIYH	D I Y HOME WAREHOUSE INC	12/2/1998
45764F30	79172	28333	IGCA	INNOVATIVE GAMING CP OF AMERICA	11/4/2002
25244640	79256	28494	DHSM40	DIAGNOSTIC HEALTH SERVICES INC	8/11/1999
94410	79367	28532	3AERN	A E R ENERGY RES INC	3/29/1999
43614110	79392	28600	HLYW	HOLLYWOOD ENTERTAINMENT CORP	
59164710	79400	28603	3MCLLQ	METROCALL INC	4/2/2001
74429030	79518	28699	PILL	PROXYMED INC	
45764220	79499	28717	INOD	INNODATA CORP	
64114430	79612	28881	NETM	NETMANAGE INC	

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
50582030	79606	28935	LUCK	LADY LUCK GAMING CORP	
59479Q10	79716	28983	MCTI	MICRO COMPONENT TECH INC	11/5/2002
86270010	79689	29040	SDIX	STRATEGIC DIAGNOSTICS INC	
46623010	79708	29073	3JPEI	JPE INC	8/6/1998
26915310	81469	29134	3ESPIQ	E SPIRE COMMUNICATIONS INC	3/22/2001
10057810	79804	29144	3BOSTQ	BOSTON CHICKEN INC	12/9/1998
23922030	79958	29317	DAWK	DAW TECHNOLOGIES INC	11/16/2001
31620P10	79960	29339	FNIS	FIDELITY NATIONAL INFO SOLNS INC	
61257010	80023	29342	PSTA	MONTEREY PASTA CO	
11482210	79942	29349	3BEANQ	BROTHERS GOURMET COFFEES INC	8/27/1998
98888110	80028	29374	3ZMBA	ZAMBA CORP	6/28/2002
61990810	80036	29397	3MTNTQ	MOTIENT CORP	1/10/2002
39054K10	80126	29608	GLUX	GREAT LAKES AVIATION LTD	8/13/2002
89692510	80285	29690	3TSMX	TRISM INC	7/20/1999
20846910	80231	29694	CSEP	CONSEP INC	
69638510	80265	29708	3PGNT	PALIGENT INC	1/3/2001
17176810	80313	29822	CDCO	CIDCO INC	
23426210	80323	29926	3DKTH	DAKOTAH INC	10/7/1998
09066V10	80310	29939	BSMD	BIOSPHERE MED INC	
90000610	80482	30008	TRBO	TURBOCHEF TECHNOLOGIES INC	
29336A10	80477	30084	3SFTW	ENLIGHTEN SOFTWARE SOLUTIONS INC	7/5/2001
36112N10	80454	30088	FUSN	FUSION NETWORKS HOLDINGS INC	4/18/2001
02145R10	80503	30130	3ALRC	ALTERNATIVE RESOURCES CORP	6/19/2001
87165510	80534	30220	SYPR	SYPRIS SOLUTIONS INC	
35803R10	80527	30252	3FRES	FRESH AMERICA CORP	5/24/2001
50345910	80640	30281	LJPC	LA JOLLA PHARMACEUTICAL CO	
45817Y10	80756	30423	ITGR	INTEGRITY MEDIA INC	
92764910	80730	30451	VBAC	VIRBAC CORP	
35038410	80818	30593	FUSA	FOTOBALL U S A INC	
90478910	80853	30600	3UNMG	UNIMARK GROUP INC	3/14/2001
04033A10	80918	30674	ARIA	ARIAD PHARMACEUTICALS INC	
59515B10	81001	30843	MTMD	MICROTEK MEDICAL HOLDINGS INC	
94402710	81018	30849	3WAVO	W A V O CORP	12/6/2000
30701A10	81079	31007	FGCIQ	FAMILY GOLF CENTERS	5/3/2000
34330210	81081	31016	3FLSCQ	FLORSHEIM GROUP INC	2/11/2002
3818810	82248	31193	3ADSX	APPLIED DIGITAL SOLUTIONS INC	
26892020	83749	31352	3EPTG	E P L TECHNOLOGIES INC	4/18/2001
04033M10	81196	31455	3ADSP	ARIEL CORP	10/15/2001
90389110	81283	31474	3ULTR	ULTRADATA SYSTEMS INC	6/27/2001
87233W10	81280	31484	3TCPI	T C P I INC	12/7/2000
69323K10	81566	31674	MALL	P C MALL INC	
63079510	80833	31689	NPRO	NAPRO BIOTHERAPEUTICS INC	
30213110	81592	31704	XPRT	EXPERT SOFTWARE INC	
30231110	81650	31854	EZEN	EZENIA INC	

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
91729430	81758	60928	USDC	USDATA CORP	
83615330	82750	60970	3SRCM	SOURCE MEDIA INC	3/7/2001
4.622E+13	81850	61069	ATEA	ASTEA INTERNATIONAL INC	
34520620	81864	61084	FORC	FORCENERGY INC COM NEW	
68219P10	82204	61102	ONTC	ON TECHNOLOGY CORP	
65249Q10	82172	61159	NEWZ	NEWSEDGE CORP	
83371910	82193	61175	3SOCT	SOCRATES TECHNOLOGIES CORP	6/29/2000
83215410	82281	61321	SMSI	SMITH MICRO SOFTWARE INC	
87426R20	82285	61335	TALK	TALK AMERICA HOLDINGS INC	
92857V10	82536	61402	VTEK	VODAVI TECHNOLOGY INC	
83569210	82526	61414	SNUS	SONUS PHARMACEUTICALS INC	
59100210	82724	61641	METG	META GROUP INC	
29089W10	82713	61758	3ISEE	EMERGING VISION INC	8/23/2001
50180330	82825	61900	LCAV	L C A VISION INC	
23256510	83129	62167	CYLK	CYLINK CORP	
37245R10	83138	62201	3GNSM	GENSYM CORP	8/15/2001
73931P20	83298	62304	3PCRV	POWERCERV CORP	8/15/2001
2.9256E+14	84639	62395	ENMC	ENCORE MEDICAL CORP	
82280910	83415	62694	3SHLL	SHELLS SEAFOOD RESTAURANTS INC	11/24/2000
14159W10	83500	62960	CGCP	CARDIOGENESIS CORP	
94769A10	83681	63056	3WLNKQ	WEBLINK WIRELESS INC	4/2/2001
74162010	83778	63233	3PMIX	PRIMIX SOLUTIONS INC	1/15/2002
68212M10	83763	63262	3ZONE	OMNI NUTRACEUTICALS INC	11/7/2000
68397310	83777	63381	OPTK	OPTIKA INC	
64353J10	83734	63388	NCEH	NEW CENTURY EQUITY HOLDINGS CORP	
55304410	83883	63490	MIMS	M I M CORP	
46061G10	83959	63556	3ICCXQ	INTERNET COMMERCE & COMM INC	7/31/2001
25614R10	83931	63606	DOCX	DOCUMENT SCIENCES CORP	
45816A10	83942	63661	ITIG	INTELLIGROUP INC	
62929410	83953	63676	NMTI	N M T MEDICAL INC	
1992410	84187	63915	3ALLN	ALLIN COMMUNICATIONS CORP	5/8/2001
74192910	84247	63952	PRTL	PRIMUS TELECOM GROUP INC	
90177410	84274	63990	TWLB	TWINLAB CORP	12/16/2002
00750B10	84287	64079	3AASI	ADVANCED AERODYNAMICS STRUC INC	4/17/2001
83085910	84333	64127	SKYM	SKYMALL INC	
19034H20	84517	64367	CDEN	COAST DENTAL SERVICES INC	
63934Q30	84553	64371	NVDC	NAVIDEC INC	
45865R20	86772	64382	DENT	INTERDENT INC	6/12/2002
73069810	84565	64402	PTSX	POINT 360	
87994630	86194	64747	TIWI	TELESYSTEM INTL WIRELESS INC	
20601810	85031	64864	CERO	CONCERO INC	8/6/2002
88110	85320	65247	TACX	A CONSULTING TEAM INC	
67082B10	85485	65665	OAOT	OAO TECHNOLOGY SOLUTIONS INC	
90261L10	85513	65725	UBIX	UBICS INC	

Appendix C
Sample Firms from the NASDAQ National Market
Cross-Sectional Firms Only (280 firms)

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
88077T10	78268	2908	3TERA	TERAFORCE TECHNOLOGY CORP	6/18/2001
13722510	81561	11010	3GUSH	CANARGO ENERGY CORP	3/29/1999
5277710	10281	12210	3AUTO	AUTOINFO INC	7/21/1998
76123230	11040	12253	3ROIX	RESPONSE ONCOLOGY INC	3/14/2001
38080410	10178	12515	3GBKF	GOLDEN BOOKS FAMILY ENT INC	2/16/1999
12870110	11727	13914	3CLCP	CALCOMP TECHNOLOGY INC	1/14/1999
18490120	78645	15086	3CCBC	CLEARLY CANADIAN BEVERAGE CORP	2/13/2001
75382N20	11653	15159	RRRRD	RARE MEDIUM GROUP INC	12/20/2002
89392920	75930	20202	TRCR	TRANSCEND SERVICES INC	
G6583Q12	84822	21233	3NORPE	NORD PACIFIC LTD	5/3/1999
89154830	81646	22765	3TSSW	TOUCHSTONE SOFTWARE CORP	7/19/1999
68398610	76683	24093	OPEN	OPENROUTE NETWORKS INC	
G3287M10	78777	25634	3EZCOE	EZCONY INTERAMERICA INC	8/5/1998
53215M10	77913	25746	3CHAI	LIFE MEDICAL SCIENCES INC	8/28/1998
45669R30	85673	25808	IARC	INFORMATION ARCHITECTS CORP	8/21/2002
71674810	78186	25874	PQUE	PETROQUEST ENERGY INC	
24478310	78177	25965	DEGE10	DEGEORGE FINANCIAL CORP	12/3/1997
92531710	78145	25976	VRSO	VERSO TECHNOLOGIES INC	
25800620	79257	28450	3DNKY	DONNKENNY INC	1/14/2000
71084710	79409	28574	3PCTV	PEOPLES CHOICE TV CORP	7/17/1998
90330N10	82850	28830	3USCM	U S C I INC	11/13/1998
N5424G10	79504	29079	MADGF	MADGE NETWORKS NV	
55305P10	79997	29406	3MKAU	M K GOLD CO	1/6/1999
17247010	80618	30348	CINE	CINERGI PICTURES ENTMT INC	
G2004520	80962	30778	3CETVF	CENTRAL EUROPEAN MEDIA ENT LTD	
49885930	81215	31464	3KNICQ	KNICKERBOCKER L L INC	8/24/1999
37025340	81248	31515	GMGCD	GENERAL MAGIC INC	9/27/2002
3200710	81267	31543	3PACEE	AMPACE CORP	10/14/1998
62818810	81570	31679	MSTG	MUSTANG COM INC	
30035510	81595	31763	EVST	EVERLAST WORLDWIDE INC	
45814T10	84223	31888	INTD	INTELIDATA TECHNOLOGIES CORP	
68554R10	81733	60813	3ORVX	ORAVAX INC	11/16/1998
98583410	81764	60815	3YESS	YES ENTERTAINMENT INC	12/7/1998
92653010	81760	60906	VIDA	VIDAMED INC	
60436310	81713	60916	MNPL	MINORPLANET SYSTEMS USA INC	
63692620	82195	61128	3NMFS	NATIONAL MEDICAL FINCL SVCS CORP	12/11/1998
15100K20	82218	61131	3CRSC	CELERIS CORP	5/21/2001
29841610	82173	61246	3EUPH	EUPHONIX INC	9/26/2001
89618740	82207	61257	TRKN	TRIKON TECHNOLOGIES INC	

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
29492910	81247	61322	3EQUUS	EQUUS GAMING CO L P	1/19/2001
433410	82247	61351	3ACMM	ACCOM INC	7/20/1998
98142H10	82539	61403	WLDA	WORLD AIRWAYS INC NEW	
97652H10	82538	61436	3WIRLQ	WIRELESS ONE INC	10/21/1998
47652340	82482	61446	3DELI	JERRYS FAMOUS DELI INC	10/9/2001
45766J10	82585	61546	INSG	INSIGNIA SOLUTIONS PLC	
64124H10	82729	61680	NSIX10	NEUROMEDICAL SYSTEMS INC	3/16/1999
80603P10	82759	61685	SSFT	SCANSOFT INC	
2.9481E+14	82695	61717	3ERGO	ERGO SCIENCE CORP	5/23/2001
86706410	83114	62041	3SNBS	SUNBASE ASIA INC	2/10/1999
84772310	83127	62046	SPDE	SPEEDUS CORP	
68384P10	83154	62122	3OPSI	OPTICAL SENSORS INC	5/11/2000
20601610	83123	62236	CPTS	CONCEPTUS INC	
98741310	87005	62257	UBET	YOUBET COM	
69366M10	83307	62317	PTEK	P T E K HOLDINGS INC	
64927110	83152	62330	3NWCIE	NEW WORLD RESTAURANT GROUP INC	11/26/2001
45815T10	83277	62455	3IMIIQ	INTELLIGENT MEDICAL IMAGING INC	5/17/1999
36291310	83267	62488	3GGEN	GALAGEN INC	1/4/2001
82765510	83311	62495	3SLVR	SILVER DINER INC	5/15/2001
48273810	83390	62549	KVHI	K V H INDUSTRIES INC	
90294810	86197	62562	USPL	U S PLASTIC LUMBER CORP	
97652L10	83359	62613	3WIRX	WIRELESS XCESSORIES GROUP INC	12/18/2000
71892810	83404	62728	PHYX	PHYSIOMETRIX INC	
25387R40	83496	62822	DVID	DIGITAL VIDEO SYSTEMS INC	
56077510	86388	62832	MAJR	MAJOR AUTOMOTIVE COMPANIES INC	
34956K20	83506	62864	FRTG	FORTRESS GROUP INC	
51323310	83498	62918	3LMARE	LAMAUR CORP	2/2/1999
94748P10	83579	62924	3WEBB	W E B B INTERACTIVE SERVICES INC	3/6/2002
15691610	83489	62933	3CEON	CERION TECHNOLOGIES INC	12/30/1998
26881P10	83653	63100	EPMD	E P MEDSYSTEMS INC	
12763910	83769	63268	3KDUS	CADUS PHARMACEUTICAL CORP	9/24/1999
87307110	83788	63398	PYTV10	T V FILME INC	2/4/1999
82705410	83795	63410	3SGIC	SILICON GAMING INC	2/22/1999
87951U10	83915	63451	3TLSP	TELESPECTRUM WORLDWIDE INC	10/30/2000
64938P10	83890	63532	3NYBSQ	NEW YORK BAGEL ENTRPRS INC	11/30/1998
52186420	83945	63662	LEAP	LEAPNET INC	
31723410	84121	63680	3ROMN	FILM ROMAN INC	1/11/2001
22161G10	84065	63695	3COSEQ	COSTILLA ENERGY INC	8/11/1999
64116A10	84078	63762	NTMV	NETMOVES CORP	
23162910	84148	63771	CUSM	CUSEEME NETWORKS INC	
29249910	84077	63854	3ENML	ENAMELON INC	10/14/1999
91728510	84141	63878	UROQ	UROQUEST MEDICAL CORP	
45812A10	84221	63944	3IMRIQ	INTEGRATED MEDICAL RESOURCES INC	12/1/1998
03820G10	84186	63945	AICX	APPLIED IMAGING CORP	

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
02261D10	84219	63955	3ALYS	ALYSIS TECHNOLOGIES INC	1/18/2001
92675K10	84280	63959	VISG	VIISAGE TECHNOLOGY INC	
3349540	84185	63972	3ADCC	ANDEAN DEVELOPMENT CORP	3/15/2000
38870710	87163	64021	GOJO	GRAPHON CORP	
59078710	84312	64145	MESG	MESSAGEMEDIA INC	
430510	84288	64171	3ACLR	ACCENT COLOR SCIENCES INC	3/16/1999
51729Y10	84317	64186	LARS	LARSCOM INC	
70291510	84324	64197	3PATI	PATIENT INFOSYSTEMS INC	9/13/2000
88554G10	84337	64201	3TDXTC	3DX TECHNOLOGIES INC	4/7/1999
42218Q10	84562	64360	3HGRD	HEALTHGRADES INC	5/14/2001
23701510	84523	64381	3DAOU	D A O U SYSTEMS INC	4/24/2001
48127110	84545	64387	JUDG	JUDGE GROUP INC	
19574610	84600	64491	3CHLD	COLONIAL HOLDINGS INC	10/18/2000
2137310	84596	64550	ALTI	ALTAIR NANOTECHNOLOGIES INC	
92656N10	84752	64560	3VNWC	VIDEO NETWORK COMMUNICATIONS INC	10/31/2001
65332P10	84747	64596	3NEXR	NEXAR TECHNOLOGIES INC	12/16/1998
28232910	84753	64644	3EGGSQ	EGGHEAD COM INC NEW	8/15/2001
23321U10	84729	64652	DGJL	D G JEWELRY INC	10/23/2002
09064Q10	84722	64680	BINX	BIONX IMPLANTS INC	
23333L10	84802	64713	DTMC	D T M CORP	
10917810	84792	64741	BEXP	BRIGHAM EXPLORATION CO	
23296810	84801	64830	DSIT	D S I TOYS INC	
29642810	85023	64863	ESHR	ESHARE COMMUNICATIONS INC	
14147M10	85005	64865	CRDM	CARDIMA INC	
37937R20	87322	64881	3GLBN	GLOBALNET FINANCIAL COM INC	9/25/2001
40392610	85012	64884	HTEI	H T E INC	
28201210	85018	64886	3EFAX	EFAX COM	8/8/2000
70471810	85030	64888	PPOD	PEAPOD INC	
71400610	85203	65024	3PTUS	PERITUS SOFTWARE SERVICES	2/3/1999
89353T10	85219	65033	TSND	TRANSCEND THERAPEUTICS INC	
92836930	85225	65034	VMTI	VISTA MEDICAL TECHNOLOGIES INC	
45031W10	85158	65045	ISEC	I SECTOR CORP	
36114Q30	87560	65114	3FTRLQ	FUTURELINK CORP	8/13/2001
48580810	86331	65126	3KASPQ	KASPER A S L LTD	2/13/2001
46621D10	85190	65145	JLMI	J L M INDUSTRIES INC	
89278210	85216	65148	TRBR	TRAILER BRIDGE INC	
6.82E+07	85306	65242	OMTL	OMTOOL LTD	
92831N10	85289	65303	3EYES	VISION TWENTY ONE INC	6/14/2000
45773210	85302	65315	3NSPRQ	INSPIRE INSURANCE SOLUTIONS INC	2/14/2002
2347710	85354	65464	AMEN	AMEN PROPERTIES INC	
G7702U10	85501	65512	3RSLCF	R S L COMMUNICATIONS LTD	12/28/2000
8.5569E+14	85505	65574	3STGC	STARTEC GLOBAL COM CORP	6/28/2001
89192410	85508	65592	3TKTL	TRACK N TRAIL	9/26/2000
58446J10	85415	65670	MBAY	MEDIABAY INC	

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
45767J10	85474	65672	3IVTC	INNOVATIVE VALVE TECH INC	5/5/1999
88077110	88267	65693	3TGCM	TERAGLOBAL COMMUNICATIONS CORP	7/24/2001
83539710	85578	65788	SOMN	SOMNUS MEDICAL TECHNOLOGIES INC	
15233P10	85583	65810	CNTV	CENTIV INC	
44860K10	85556	65825	3HYBR	HYBRID NETWORKS INC	4/5/2002
15976510	85539	65850	CTHR	CHARLES & COLVARD LTD	
29331310	85573	65897	3ENHT	ENHERENT CORP	5/29/2001
45245V10	85696	65961	3IMAG	IMAGEMAX INC	1/28/1999
68210T20	85707	65973	OMNID	OMNI ENERGY SERVICES CORP	
33892310	85689	66026	3FLXI	FLEXIINTERNATIONAL SOFTWARE INC	10/6/1999
34390910	85690	66027	FOCL	FOCAL INC	
46419210	85697	66062	3ISAC	I C ISAACS AND CO INC	7/19/2001
82489410	85846	66526	SHOE	SHOE PAVILLION INC	
9128320	85804	66610	BDMS	BIRNER DENTAL MNGMT SVS INC	
60053320	85835	66631	MEXP	MILLER EXPLORATION COMPANY	
29690410	86325	66636	3ESFT	ESOFT INC	1/11/2002
69511V10	88459	66649	PACT	PACIFICNET INC	
26250420	85867	66657	DSET	DSET CORP	11/25/2002
36230D20	85866	66682	3GSVI	GSV INC	3/13/2001
27032B10	85868	106228	ERTH	EARTHSHELL CONTAINER CORP	
87815F10	86296	108453	TMTV	TEAM COMMUNICATIONS GROUP INC	3/15/2002
10947N10	85964	109581	3BTSR	BRIGHTSTAR INFORMATION TECH INC	7/2/2001
23302710	85975	109920	DACG	D A CONSULTING GROUP	
33748410	85979	110100	FVCX	FIRST VIRTUAL COMMUNICATIONS INC	
91138420	86093	110106	3URSI	UNITED ROAD SERVICES INC NEW	5/19/2000
12991410	86058	110239	3CLBRQ	CALIBER LEARNING NETWORK INC	6/15/2001
62473L10	86077	110326	3MPWRQ	MPOWER HOLDING CORP	4/3/2002
00206P10	86049	110379	3ATGCQ	A T G INC	11/19/2001
43357C10	88350	110800	3HTVN	HISPANIC TELEVISION NETWORK INC	8/2/2001
57634610	86179	111408	3MAGRQ	MASTER GRAPHICS INC	1/21/2000
8.86E+33	86193	111731	3BYNDQ	BEYOND COM CORP	1/24/2002
622810	86237	112473	ADGO	ADAMS GOLF INC	
45169Q10	86274	112622	3IENT	IENTERTAINMENT NETWORK INC	4/4/2001
90338Y10	86262	112877	USOL	U S O L HOLDINGS INC	11/13/2002
43785810	86266	112878	3HCAR	HOMETOWN AUTO RETAILERS INC	2/13/2001
56377110	86728	112968	MTEX	MANNATECH INC	
90131410	86338	113498	TFSM	24 7 REAL MEDIA	
88335R10	86436	115313	3TGLO	THEGLOBE COM	4/20/2001
9608410	88426	116031	3BLZN	BLUE ZONE INC	8/7/2001
81616X10	86489	116504	SCSS	SELECT COMFORT CORP	
04314Q10	86520	116826	3ALIF	ARTIFICIAL LIFE INC	8/17/2001
92335X10	87770	118834	3VRDOQ	VERADO HOLDINGS INC	11/15/2001
77957X10	86784	118875	ROWE	ROWECOM INC	
46588H10	86777	119034	IVIL	IVILLAGE INC	

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
5333110	86766	119174	AWEB	AUTOWEB COM INC	
22674V10	86768	119273	CPTH	CRITICAL PATH INC	
76243020	86862	119477	3RTHMQ	RHYTHMS NET CONNECTIONS INC	5/29/2001
91731180	86848	119597	3USIQE	USINTERNETWORKING INC	1/4/2002
54047310	86833	119894	3LOAX	LOG ON AMERICA INC	10/31/2001
64107U10	86838	119957	NETP	NET PERCEPTIONS INC	
75523620	86842	120063	RAZFD	RAZORFISH INC	
03828R10	86816	120154	3ATHYQ	APPLIEDTHEORY CORP	4/25/2002
66661010	86905	120278	3NPNTQ	NORTHPOINT COMMUNICATIONS GP INC	1/16/2001
06646V10	86895	120458	3RATE	BANKRATE INC	1/26/2001
53218N10	88638	120574	3LEFX	LIFE FX INC	11/14/2001
6.5332E+14	86934	120593	NXRA	NEXTERA ENTERPRISES INC	
88033A10	86922	120723	TENF	TENFOLD CORP	11/11/2002
6784610	86930	120773	BNBN	BARNESANDNOBLE COM INC	
48204810	86898	120818	JWEB	JUNO ONLINE SERVICES INC	
64120S10	87018	120956	3NASC	NETWORK ACCESS SOLUTIONS CORP	7/26/2001
42979U10	86972	121078	3HSAC	HIGH SPEED ACCESS CORP	7/9/2002
26209810	86980	121134	3KOOP	DRKOOP COM INC	4/27/2001
27784T20	86983	121437	EASY	EASYLINK SERVICES CORP	
58500110	86986	121560	3MDNX	MEDINEX SYSTEMS INC	5/9/2001
74833W10	86989	121662	3PASA	QUEPASA COM	
90340410	86998	121693	SRCH	U S SEARCH COM INC	
71532910	86991	121720	PRSW	PERSISTENCE SOFTWARE INC	
97815010	87008	121762	WFHC	WOMEN FIRST HEALTHCARE INC	
M2559610	87061	121793	CTCH	COMMERCE TOUCH SOFTWARE LTD	
4517410	87100	121834	ASKJ	ASK JEEVES INC	
7330910	87101	122075	3BEOSZ	BE INC	3/15/2002
05069A10	87051	122094	ADBL	AUDIBLE INC	
45809K20	87074	122263	INSW	INSWEB CORP	
65333Q20	87058	122316	NXPS	NEXPRISE INC NEW	
26224110	87105	122355	DSCM	DRUGSTORE COM INC	
8989610	87157	122377	3BGST	BIGSTAR ENTERTAINMENT INC	1/16/2001
97814910	87365	122680	WOMN	WOMEN COM NETWORKS INC	
46114Q10	87169	122737	3ITWR	INTERWORLD CORP	5/3/2001
46059S20	87156	122895	IPIX	INTERNET PICTURES CORP	
54344210	87173	122917	LOOK	LOOKSMART LTD	
45244D10	87195	123015	IMGX	IMAGEX INC	
6.4114E+24	87335	123099	3NETRZ	NETRADIO CORP	10/17/2001
48360030	87241	123998	KANA	KANA SOFTWARE INC	
74341U10	87239	124201	3PRMO	PROMOTIONS COM INC	6/28/2001
23437N10	87313	124318	DALN	DALEEN TECHNOLOGIES INC	12/30/2002
03833V10	87230	124320	APTM	APTIMUS INC	
64122T20	87253	124324	3NWKC	NETWORK COMMERCE INC	8/28/2001
87943L10	87256	124326	TMNT	TELEMATE NET SOFTWARE INC	11/16/2001

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
45885A10	87236	124358	INAP	INTERNAP NETWORK SERVICES CORP	
92855210	87353	124440	VIXL	VIXEL CORP DEL	
2.63E+07	87316	124595	DSLN	D S L NET INC	
50238610	87319	124675	LTWC	L T W C CORPORATION	
92848M10	87355	124683	VSHP	VITAMINSHOPPE COM INC	
94845V10	87428	124684	3WBVNQ	WEBVAN GROUP INC	7/6/2001
44959210	87325	124975	IGOC	IGO CORP	
64108P10	87334	124976	3NCNTQ	NETCENTIVES INC	9/17/2001
92553R10	87352	125461	3VIAD	VIADOR INC	10/30/2001
1949610	87300	125596	ARCC	ALLIED RISER COMMUNICATIONS CORP	
7330810	87376	125795	BFRE	BE FREE INC	
64122W30	87403	125976	3NETZ	NETZEE INC	5/23/2002
88633M20	87422	125978	TIXX	TICKETS COM INC	
75087510	87414	126434	RMKR	RAINMAKER SYSTEMS INC	
80908Q10	87420	126600	SQST	SCIQUEST INC	
53220Q10	87396	126620	LFMN	LIFEMINDERS INC	
58446B10	87399	126621	MPLX	MEDIAPLEX INC	
24783N10	87384	126714	DDDC	DELTATHREE INC	
83291420	87308	126836	CIRC	SNYDER COMM INC CIRCLE COM	
49918410	87496	127094	3KNOT	KNOT INC	8/22/2001
42221V40	87491	127180	3HCENQ	HEALTHCENTRAL COM	10/9/2001
18272820	87480	127274	3CLSCQ	CLASSIC COMMUNICATIONS INC	11/13/2001
58464210	87502	127381	3MDLIQ	MEDICALOGIC MEDSCAPE INC	1/24/2002
39808110	87523	127438	GRIC	GRIC COMMUNICATIONS INC	
28234310	87486	127535	EGRT	EGREETINGS NETWORK INC	
64047550	87574	128541	NEOF	NEOFORMA INC	
42222H30	87561	128599	3HGAT	HEALTHGATE DATA CORP	5/23/2002
87920210	87634	129120	TLXS	TELAXIS COMMUNICATION CORP	
31187710	87830	129470	FSST	FASTNET CORP	
12426910	87591	129518	3BUYX	BUY COM INC	8/13/2001
6.8617E+14	87624	129629	OGNC	ORGANIC INC	
23274320	87597	129839	CYCO	CYPRESS COMMUNICATIONS INC	
29015130	87602	129840	ELOY	ELOYALTY CORP	
92208W10	87641	129848	VMDC	VANTAGEMED CORP	9/23/2002
92228110	87643	129849	3VSTY	VARSITY GROUP INC	3/20/2001
51654010	87616	130043	LNTE	LANTE CORPORATION	
80542310	87633	130305	SVVS	SAVVIS COMMUNICATIONS CORP	
29014010	87651	130400	ELOQ	ELOQUENT INC	
5356610	87587	132361	AVEA	AVENUE A INC	
6.4107E+14	87622	132406	NTGX	NET GENESIS CORP	
68338T40	87797	132482	ONVID	ONVIA COM	
46262810	87783	132600	IPRT	IPRINT TECHNOLOGIES INC	10/1/2002
30515810	87768	132799	FAIM	FAIRMARKET INC	
4.5321E+14	87780	132978	3IMPV	IMPROVENET INC	6/28/2001

CUSIP	PERMNO	GVKEY	TICKER	COMPANY	DELISTED
54575410	87790	132980	LOUD	LOUDEYE CORP	
45817B30	87779	133045	IISX	INTEGRATED INFORMATION SYS INC	
88801110	87795	133047	TPTI	TIPPINGPOINT TECHNOLOGIES INC	
70214P10	87803	133184	PRTS	PARTSBASE INC	
44958910	87815	133186	IGNX	I G N ENTERTAINMENT INC	
29076P10	87764	133324	3EEEE	EMACHINES INC	5/24/2001
29435210	87765	133325	EPRS	EPRISE CORP	
25386P10	87766	133326	3DGLHQ	DIGITAL LIGHTHOUSE CORP	7/13/2001
04315D40	87751	133425	ARTD	ARTISTDIRECT INC	
42222N10	88167	133766	HSTM	HEALTHSTREAM INC	
46571310	88169	133867	IIIM	I3 MOBILE INC	
53814610	88174	133869	LPSN	LIVEPERSON INC	
21648510	88247	134025	3CSAV	COOLSAVINGS INC	11/20/2001
45073P40	88251	135705	3IBEMQ	IBEAM BROADCASTING CORP	10/10/2001
M2508210	88330	137110	CKSW	CLICKSOFTWARE TECHNOLOGIES LTD	
67457P10	88321	137130	OCCM	OCCAM NETWORKS INC DEL	7/24/2002
14172610	88328	137374	CARE	CARESCIENCE INC	
83408W10	88467	137611	SOHU	SOHU COM INC	
89677510	88474	137668	3TNSIE	TRITON NETWORK SYSTEMS INC	
45072L10	88530	138465	IAWK	IASIAWORKS INC	3/8/2002
M8186710	88559	138621	RDVW	RADVIEW SOFTWARE LTD	

VITA

William H. Belski (Bill) was born in Uniontown, PA on June 22, 1969. He received his Bachelor of Arts degree in Accounting and Liberal Arts from Washington and Jefferson College in May 1991. After graduation, Bill went on to work for American General as an insurance underwriter and at H&R Block as a tax preparer while studying for the certified public accounting (CPA) exam. During this period, he also attended California University of Pennsylvania while working as a research assistant in the Department of Earth Sciences. Bill secured his first accounting position at McClure & Wolf, CPA in Uniontown, PA in the spring of 1992 where he worked for three years as a staff and in-charge accountant. During these three years, Bill participated in audits, tax preparation, and consulting services for middle market professional and governmental clients. Bill passed all four parts of the CPA exam in May 1994. He entered the University of Notre Dame MBA program in June 1995 and graduated in May 1996 with an emphasis in Finance and Taxation. During his 11 months in South Bend, IN, Bill worked part-time as a tax associate for Crowe Chizek & Company. After graduation from Notre Dame, Bill accepted a tax consulting position with Coopers & Lybrand, LLP in Pittsburgh, PA from July 1996 through July 1997 before entering the doctoral program at Virginia Polytechnic and State University in Blacksburg, VA in August 1997.

During Bill's residence at Virginia Tech, he worked three summers (1998-2000) as a research assistant to Professor Tom Frecka at the University of Notre Dame and as a teaching assistant in the Ernst & Young YMP program at Notre Dame. While pursuing his doctorate, Bill was a KMPG Doctoral Fellow for five consecutive years.

Bill worked as an instructor at the University of Miami for the 2001-02 academic year. As of August 2004, he is employed with Samford University at the rank of assistant professor.