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Do speculative short sellers detect earnings management?

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DO SPECULATIVE SHORT SELLERS DETECT EARNINGS MANAGEMENT?

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctoral of Philosophy
in

The Department of Accounting

By

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ABSTRACT

This paper examines empirically whether sophisticated speculative short sellers can detect earnings management by targeting stocks with large income-increasing discretionary accruals and high total accruals. Prior research indicates that total accruals are overpriced and this overpricing is largely attributable to the mispricing of discretionary accruals. Recent studies show that neither auditors nor financial analysts utilize information in accruals. Using samples of 11,537 firm-quarter observations and 5,118 firm-year observations for 1,146 12/31 non-financial NYSE firms from 1992 to 1999, I find supporting evidence those speculative short sellers can detect earnings management using financial accounting information disclosed in 10-Q and 10-K report. Specifically, I identify a significant and positive association between relative short interest and quarterly accruals. When I decompose accruals into its discretionary and non-discretionary components, I find that quarterly discretionary accruals are positively and significantly related to relative short interest. I further divide quarterly data into four sub-samples of separate fiscal quarters and find that speculative short sellers detect earnings management especially in the third and fourth quarters of a fiscal year and trade consistent with the information provided in quarterly accruals. In addition, the empirical results indicate that speculative short sellers establish short positions in firms with high accruals and large income-increasing discretionary accruals estimated using annual financial accounting information.

1. INTRODUCTION

This paper examines whether sophisticated short sellers can detect earnings management and thus target stocks with large income-increasing discretionary accruals and high total accruals. Earnings management has drawn increasing attention of regulators, accounting standard setters, and investors. In 1998, the Chairman of the Securities and Exchange Commission (SEC), Arthur Levitt argued that earnings management practice masked the underlying performance of the firm and advocated increasing the quality of the reported earnings. In December 1999, the New York Stock Exchange (NYSE) strengthened the rules for audit committee by requiring all listed firms to have an audit committee consisting of at least three independent directors, among whom at least one committee member has accounting or financial management expertise. Accounting frauds and corporate scandals at Enron and WorldCom make a campaign against earnings management imminent. In 2002, the U.S. congress passed the Sarbanes-Oxley Act to improve the accuracy and reliability of corporate financial reporting and disclosures.

Prior accounting research has explored earnings management incentives from three perspectives: (1) capital market expectations and valuations (e.g. Sloan 1996; Teoh, Welch, and Wong 1998ab; Erickson and Wang 1999; Xie 2001); (2) contracting motivations (e.g. Healy 1985; DeAngelo 1988; DeFond and Jiambalvo 1994); and (3) industry regulation and other regulations (e.g. Petroni 1992). This study focuses on the first motivation by examining whether the speculative short sellers can detect earnings management and anticipate capital market consequences. Short sellers engage in short selling by borrowing a security from a broker and selling

it with a promise to return it at a later date. They earn a profit from the decline in a security's price. Furthermore, they are highly motivated to detect income-increasing earnings management because they can profit directly from the overpricing of discretionary accruals.

Previous research has provided conflicting evidence on whether investors can detect earnings management. Some studies have shown that investors appear able to see through earnings management in the banking and insurance industry (e.g. Petroni 1992; Wahlen 1994; Petroni, et al. 1997; Penalva 1998). In contrast, several recent studies have shown that investors may not fully detect earnings management. Specifically, Sloan (1996) documents that the market overprices total accruals. He finds that firms with high accruals experience large negative earnings reversals and significantly lower returns in the subsequent year. Collins and Hribar (2000a) provide additional evidence of the accrual anomaly using quarterly data. They find that the accrual (cash flow) component of earnings appears to be overpriced (underpriced) because the persistence of the accrual (cash flow) component of earnings is overestimated (underestimated). Xie (2001) further investigates the market pricing of accruals by dividing total accruals into two components: normal and discretionary accruals. His findings suggest that discretionary accruals are overpriced and the overpricing of total accruals documented in Sloan (1996) is largely attributable to the mispricing of discretionary accruals. Chambers (1999) demonstrates that investors who cannot identify the managed portion of reported earnings are likely to overvalue firms with income-increasing earnings management and undervalue firms with income-decreasing earnings management. Other studies

provide additional empirical evidence of mispricing associated with opportunistic earnings management (e.g. Vargus and Beneish 2001; Barth and Hutton 2001; DeFond and Park 2001).

Two recent studies (Teoh and Wong 1999; Bradshaw, et al. 2001) present evidence that neither sell-side financial analysts nor independent auditors provide investors with information on the future earnings implications of firms with high accruals. Teoh and Wong (1999) find that the earnings forecast errors persist up to four years after the new equity issuance. They show that forecast errors can be explained largely by the discretionary accruals in the issuing year. Richardson (2003) finds no systematic evidence that short sellers anticipate lower future returns on the stocks with high total accruals using the accounting information disclosed in the annual report.

This paper investigates whether the speculative short sellers can detect earnings management by using quarterly (annual) accounting data and monthly short interest¹ data from 1992 to 1999. Speculative short sellers have strong incentives to detect earnings management because they can greatly benefit from lower future returns on firms that engage in income-increasing earnings management. Staley (1997) describes how fundamental analysis is practiced on Wall Street and illustrates that short sellers employ fundamental analysis to identify overvalued securities. This paper is distinguished from prior studies by examining the association between directional earnings management as proxied by discretionary accruals and speculative short selling activity. Unlike prior research examining on short selling activity as a whole, this paper distinguishes speculative short selling from other short selling

¹ Short interest refers to the number of shares that have been sold short.

activities motivated by arbitrage and hedging purposes and focuses on speculative short selling only. In addition, this study employs a different research design and dataset than those used in prior research. The results indicate that speculative short sellers establish short positions in stocks with high quarterly total accruals. More importantly, the results also suggest that speculative short sellers can distinguish discretionary accruals from normal accruals and target stocks that have large income-increasing discretionary accruals, especially in the third and the fourth quarters of the fiscal year.

I further use annual data to examine the relation between speculative short selling and accruals (discretionary accruals). The results indicate that speculative short sellers use accruals information disclosed in the 10-K report and target stocks with high total accruals and large income-increasing discretionary accruals. This paper contributes to the accounting literature on earnings management by providing empirical evidence that sophisticated speculative short sellers can detect earnings management. This paper also provides further insight into how short sellers incorporate financial accounting information into their trading strategies.

The remainder of the paper proceeds as follows: Section 2 discusses the prior literature on short selling and earnings management. Section 3 presents the hypotheses. Section 4 discusses the sample selection and descriptive statistics of the data. The research design and model specification are presented in Section 5. Empirical results are illustrated in Section 6. Section 7 reports the results of the sensitivity analysis and concluding remarks are presented in Section 8.

2. SUMMARY OF PRIOR LITERATURE ON SHORT SELLING AND EARNINGS MANAGEMENT

2.1 Prior Research on Short Selling

A short sale refers to a sale of a security that a seller does not own or owns but sells without an intention to deliver. To effectively sell a security, a short seller borrows the security from other sources such as institutional investors and broker-dealers. The short seller covers the short position by returning the security to the lender at a later time. Short sellers engage in short selling activity to profit from the expected decrease in the security price or to hedge the risk of a long position in the same underlying security or in another security whose value is linked with the underlying security. Short sellers can also short sell against the box to defer capital gains tax to a later year before Tax Payer Relief Act of 1997. I refer to short sellers who do not trade for hedging, arbitrage, or tax purpose but only to gain from the anticipated downward movement of the security price as “speculative short sellers”.

The maximum gain on a short position is the sales proceeds when the security price decreases to zero. However, the potential downside risk on a short position may be theoretically infinite. Short selling is prohibited in many foreign stock markets due to the high risk involved in the short selling activity. Additionally, short sale could drive the security price down substantially. Meeker (1932) argues that the stock market crash in 1929 may have been exacerbated by short sales. Consequently, U.S. regulators have established strict rules to monitor short selling activities due to this special risk-return profile. In 1934, the Congress enacted the Securities and Exchange Act which included restrictions on short selling. Section 10(a) of the Exchange Act grants the Securities and Exchange Commissions (SEC)

authority to regulate short sales of securities registered on a national securities exchange. Under Rule 10a-1, subject to certain exceptions, short sales of a listed security can only be accomplished on a “plus tick” or a “zero plus tick” basis. The “plus tick” refers to short selling at a price above the price of an effective sale immediately prior to the short sale. A “zero tick” refers to a short sale at the last sale price if it is higher than the last difference price. It follows that a short seller cannot sell short unless the selling price is higher than the last sales price or the selling price is the same as the last sales price if the most recent price was moving upward. Both the New York Stock Exchange (NYSE) and American Stock Exchange (AMEX) have adopted this tick test for a short sale. The tick test reflects the SEC’s concern of the adverse effect of short sales in a downward moving market. The SEC adopted the “up-tick” rule in order to allow relatively unrestricted short selling in an upward moving market and to prevent the use of short selling as a means of driving the market down.

Rule 10a-1 only applies to short selling of securities listed or traded on an exchange. In 1986, National Association of Securities Dealers (NASD) proposed the adoption of similar short sales restriction covering NASDAQ National Market System (NMS) securities. In 1994, the SEC approved NASD’s rule. Under the NASD short sale rule (Rule 3350), NASD members cannot sell short NMS securities at or below the current best (inside) bid when that bid is lower than the previous best (inside) bid. This is also known as the “bid test”. McCormick and Reilly (1996) examine the economic impact of the Nasdaq short sale rule and find that the rule is effective in restricting short selling at the inside bid over the period of large security

price downward movement without decreasing the market quality. They conclude that the objective of the NASDAQ short sale rule has been achieved.

On August 25, 1988, the SEC adopted Rule 10b-21, which is designed to mitigate price manipulation by short sellers around seasoned equity offerings (SEOs). Short sellers may establish short positions prior to SEOs and cover their short positions by purchasing the shares at the fixed offering price, which makes the underlying equity subject to price manipulation and short selling less risky. Safieddine and Wilhelm (1996) examine the short selling activity prior to SEOs and find that before SEC Rule 10b-21, short interest measured between the announcement date of SEOs and the offer date is three times the short interest accumulated over the period of three months before the announcement. In addition, short selling activity returns to its normal level following the offer date. The increase in short selling activity is related to the large equity issuance discount. However, the levels of short interest over the period from the issuance announcement date to the offer date decreases significantly following the adoption of Rule 10b-21. They also find that the issuance discounts are smaller after Rule 10b-21 adoption when compared to discounts observed prior to its adoption. Safieddine and Wilhelm (1996)'s findings suggest that Rule 10b-21 restricted the short selling activity prior to the SEOs and lowered the issuance discount.

Diamond and Verrecchia (1987) developed a theoretical framework for short selling constraints and predicted on the impact of these constraints on price adjustment to private information. They theorized that there are two types of short selling costs: short prohibition costs and short restriction costs. First, short

prohibition costs prevent investors who want to sell short from short selling. Some institutional investors and corporate insiders are prevented from short selling by regulations or terms in the contracts. The Investment Company Act of 1940 prohibits investment companies from engaging in short selling activities except under special circumstances. The Employee Retirement Income Security Act (ERISA) forbids short selling by pension funds. Some special accounts such as retirement and custodial accounts are prohibited from short sales as well. In addition, the uptick rule prohibits short selling at prices lower than the last differing price.

Second, Diamond and Verrecchia (1987) define short restriction costs as those additional costs imposed on short sellers. These costs include the non availability of sales proceeds to short sellers and the low interest that may accrue on these proceeds. Short sellers do not obtain sales proceeds. The sales proceeds are retained as collateral for the owner of the borrowed securities. Typically, small short sellers do not receive any interest on the retained sales proceeds although large short sellers may. Geczy, et al. (2002) examines the equity lending market and short selling, and illustrate that an equity loan is a temporary exchange of ownership. The lender transfers legal ownership of some shares to the borrower. At the same time the borrower transfers collateral, which is usually in the form of cash and typically 102% of equity value. In the loan contract, a rebate rate represents the interest on the collateral that the lender rebates to the borrower, and is determined by negotiation between the lender and the borrower. From the equity borrower's perspective, the rebate rate is essentially the interest on his/her loan. In the case of short selling, a broker acts as an intermediary of an equity loan. If an institutional investor has been

identified as the equity lender, the institution has to pay interest to the broker on the sales proceeds. The broker profits from the spread between the interest rebate paid to the short seller and the interest collected from the equity lender. The level of interest rate depends on the broker's difficulty in locating the shares to be borrowed. Equities that are easy and inexpensive to borrow have a high rebate rate. D'Avolio (2001) and Reed (2001) document that the borrowing cost for a large portion of stocks they analyzed is low and that the rebate rate follows the overnight Fed Fund rate very closely. Asquith and Meulbroek (1995) document that the rebate rate is usually the Fed Funds rate minus 0.25% for the most easily borrowed shares. On the contrary, the rebate rate for stocks that are expensive to borrow is low or even negative. Stocks with low or negative rebate rate are "on special" or "hot". A negative rebate rate is essentially a premium. That is, the equity borrowers are obligated to pay a premium to the lender for the right to borrow, instead of receiving any interest on the collateral from the lender. In the case of short sale, short selling becomes very costly if the stocks are on special. If the borrowed equities are from a retail margined account instead of an institutional investor, the owners of the stock do not obtain either the sales proceeds or interest because they are not informed that their stocks have been lent.

The Federal Reserve established Regulation T, which requires that short sellers deposit 50% of the market value of the securities that have been sold short. A short seller may face a margin call and be obligated to add more funds into his/her margin account if the price of the shorted stock increases. The NYSE requires a minimum maintenance margin of 30% of the greater of the current market value of

the security or \$5 per share. The margin deposit may take the form of interest-bearing treasury securities.

Furthermore, short sellers are required to reimburse the security owner for any subsequent dividend declared over the period when the short position is open. Frank and Jagannathan (1998) document that the price of the ex-dividend stock is typically higher than the price of the pre-dividend share less the dividend.

Short sellers borrow securities from other investors. The equity lending market increases the risk of the short sellers by exposing them to “short squeezes”. The security loans are “demand loans,” that is, the owner of the borrowed security can sell the security at any time. If this occurs, short sellers must close the short position accordingly. A short squeeze occurs when alternative lenders are not available and the short sellers must purchase the security in the open market to cover the short position. Short sellers may identify the owners of the borrowed shares to reduce the risk of a short squeeze. The brokers may reveal the identity of the lender to large short sellers such that short sellers may use this information to assess the probability of a short squeeze. Short sellers are less likely to face a short squeeze for stocks with high institutional ownership because a substitute for the stock lender can be easily found.

The costs and risks of short selling discussed above suggest that short sales are much more costly than establishing a long position in a security. Diamond and Verrecchia (1987) propose that short sellers are more likely to be informed because rational investors engage in short selling only if the benefit generated from a short sale outweighs the cost incurred. In other words, short sellers expect the security

price to decrease to the extent that it is sufficient to compensate them for the risks and costs they bear. In their analytical model, informed traders have private information and know the true liquidation value of the underlying risky security, whereas uninformed traders infer the value of the security based on all public information. Their model predicts that the costs of short selling affects the composition of the informed versus uninformed traders in the pool of the short sellers.

Short selling literature is dominated by the view that short interest is a bearish indicator. Hana (1976) argues that short interest is a bullish indicator because it implies a future demand for the underlying security. However, numerous more recent studies suggest that short interest conveys bearish information content. Figlewski (1981) proposes that the actual volume of short selling provides an indication of the extent of adverse belief about the value of stock in the market. His result indicates that lower short interest portfolios experience substantially higher realized returns than the high short interest portfolios counterpart. In other words, excess returns seem to be negatively correlated with short interest, which is a proxy of negative information. However, with the constraint of obtaining proceeds of a short sale, neither the short portfolio nor the arbitrage portfolio produced excess profits. Other studies fail to identify a strong systematic relation between short interest and equity returns (Brent, Morse and Stice 1990; Woolridge and Dickinson 1994; Figlewski and Webb 1993). Senchack and Starks (1993) document that stocks with unexpected increases in short interest experience significantly negative abnormal returns for a brief period surrounding the short interest announcement date.

Asquith and Meulbroek (1995) use on a sample of firms that have high level of relative short interest (e.g. short interest as a percentage of the number of shares outstanding is no less than 2.5%). They argue that the process of random sample selection leads to an inability to observe a strong or consistent relationship between short interest and excess return. This is because the random sample used in the previous research includes a large portion of firms that do not have short interest or have a very small percentage of short interest in a given month. They find a strong negative relationship between short interest and subsequent stock returns, both during the time the stocks are heavily shorted and in the subsequent two years. Abnormal returns are even more highly negative for firms that are heavily shorted for more than one month. This result is consistent with the view that short interests convey negative information.

Diamond and Verrecchia (1987) develop a theoretical model of short selling. In their analytical framework, short sellers are more likely to be informed traders because short selling is very costly. Their model predicts that increasing the cost of short selling drives relatively more uninformed traders out of the pool of short sellers because only informed traders are willing to bear the high cost in order to realize anticipated benefits. Reed (2002) provides supporting evidence of Diamond and Verrecchia's prediction that short sales' constraints reduce the speed at which the prices adjust to private information. Arnold, et al. (2002) present supporting evidence of the proposition of the extended Diamond and Verrecchia model by documenting the information content of the short interest increases after Tax Payers' Relief Act of

1997 which eliminates the tax loop hole of the “short sale against box”². Recent empirical research on short selling provides additional supporting evidence that short interest is a strong bearish signal. Aitken, et al. (1998) show that short sales are instantaneous bad news by examining the intra-day price reaction to the information on short interest of stocks traded on the Australian Stock Exchange. Dechow et al. (2001) illustrate that short sellers utilize information in the fundamental ratios by targeting stocks with low ratios of earnings to the market value (book value to the market value) because these firms have lower future returns. Desai et al. (2002) provide additional evidence that heavily shorted NASDAQ firms experience significant negative abnormal returns ranging from -0.76% to -1.13% per month. The positive relation between the negative return and the level of short interest indicates that a high level of short interest is a strong bearish signal. They also show that heavily shorted firms experience a higher probability of being delisted.

2.2 Prior Research on Earnings Management

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...

Extant accounting literature on earnings management focuses on trying to answer two questions: (1) Does earnings management exist? (2) Why do managers engage in earnings management? The typical approach is to identify the managerial

² Short sale against the box refers to a transaction in which an investor holds a long position in a security sells the same security short.

incentive structure to manage earnings and examine whether the unexpected accounting accruals or accounting method choices are consistent with these incentive mechanisms. Accounting researchers examine the motivation for earnings management from three perspectives: (1) capital market expectations and firm valuations; (2) contracts based on the accounting numbers; (3) regulation (Healy and Wahlen 1999). This paper focuses on the first motivation, that is, equity market motivated earnings management.

Value-relevance capital market research documents that accounting information such as earnings has information content. Investors make their investment decisions using firm-specific accounting information. Market reaction to unexpected earnings is reflected in a significant price movement and a change in trading volume (e.g. Ball and Brown 1968; Beaver 1968; Bamber 1986; Bamber 1987). Investors use firm-specific accounting information in equity valuation and optimize their investment portfolio accordingly. This creates an incentive for managers to engage in earnings management to affect the equity pricing. Similarly, financial analysts are a large group of professionals that use accounting information extensively. It is well documented in the financial analyst forecast literature that analyst forecasts outperform time-series models as surrogates for market expectations of earnings (Brown and Rozeff 1978; Fried and Givoly 1982) because of timeliness and the rich information set of financial analysts. Accounting information is a large component of the information set of financial analysts. The incorporation of the accounting information in analysts' forecasts creates managerial incentives to manage

earnings to affect the market expectation of earnings and thus have impact on stock price.

Dye (1988) theorizes the demand for earnings management from two perspectives: internal demand and external demand. He posits that the external demand for earnings management is driven by the existing shareholders' attempts to change prospective investors' valuations of the firm. [Trueman and Titman \(1988\)](#) provide an explanation of earnings smoothing as managerial incentive to reduce the claimholders' perception of the volatility of the economic earnings of the firm and affect their investment decisions accordingly.

Many studies explore the capital market incentive for managers to engage in earnings smoothing by examining unexpected accounting accruals in specific transactions in which managers are highly motivated to manage earnings. Management buyouts (MBO) may motivate managers to manipulate earnings downward prior to the buyout. The empirical evidence on earnings management prior to management buyouts is mixed. [DeAngelo \(1986\)](#) examines the accrual changes of buyout firms and the result does not support the earnings management hypothesis. In contrast, [Perry and Williams \(1994\)](#) document significant income-decreasing unexpected accruals before MBOs. [Wu \(1997\)](#) examines 87 MBO cases over the period of 1980-1987 and provides supporting evidence that managers manipulate earnings downward prior to the MBO proposal. He reports a systematic relationship between the stock price decline in the pre-MBO period and pre-MBO earnings changes. He also shows that the estimated benefit from downward earnings manipulation of the sample firms is about \$50 million. [Marquardt and Wiedman](#)

(2003) use the performance-matched approach developed by Kothari, et al. (2001) to estimate the unexpected component of accounts receivable, inventory, accrued liabilities, depreciation expenses, and special items. They find unexpected negative accounts receivable for a sample of MBOs.

Erickson and Wang (1999) examine earnings management around stock mergers using a sample of acquiring firms. They find that acquiring firms manipulate earnings upward in the quarter prior to a stock merger and conclude that the result is consistent with the notion that acquiring firms engage in income-increasing earnings management to boost their prices before a stock merger. Their study also shows that discretionary accruals are positively associated with the economic benefit to the acquiring firm measured as the relative size of the deal (deal value scaled by the market value of the acquiring firm).

Several studies examine earnings management in the context of equity offerings. Managers are highly motivated to engage in income-increasing earnings management to boost stock prices. Teoh, Welch, and Wong (1998a) examine the relationship between earnings management measured by discretionary accruals and the long-run underperformance of Initial Public Offering (henceforth, IPO) firms documented in Loughran and Ritter (1995). They find that large discretionary accruals are significantly and negatively related to abnormal stock returns following the equity offerings. They document that a hedge portfolio consisting of a long position in the firms with low discretionary accruals and a short position in firms with high discretionary accruals yields a mean excess return of 102% in the three-year period right after the first fiscal year end. In addition, Teoh, Wong, and Rao (1998)

provide empirical evidence that IPO firms use discretionary accruals to influence investor perceptions and the valuation of the firm. Specifically, they show that firms with high levels of discretionary working capital and total accruals in the year when the firm goes public have lower future cash flows. Their findings indicate that net income and cash flows from operations increase in the fiscal year prior to the IPO and decrease in the year of the IPO.

Other studies provide empirical evidence of earnings management around seasoned equity offerings (henceforth SEO). Teoh, Welch, and Wong (1998b) report that issuing firms engage in earnings management via significant income-increasing discretionary accruals prior to the SEO. These firms experience subsequent poor stock price performance and lower net income. They find that the negative relationship between discretionary accruals and stock returns is stronger for SEO firms than for non-issuing firms. Their result suggests that earnings management provides some explanation for the underperformance of firms after SEOs that was documented in Spiess and Affleck-Graves (1995). They conclude that investors do not see through earnings management prior to the SEO and fail to discount the managerial manipulations of reported earnings prior to SEOs.

Rangan (1998) conducts a similar study by examining whether the earnings management around SEOs explains the underperformance of SEOs and finds that both earnings changes and market-adjusted stock returns are significantly and negatively related to discretionary accruals prior to the offering. His result indicates that SEO firms are overvalued by the capital market and experience a significant decline in earnings driven by earnings management around the offering. Shivakumar

(2000) draws a different conclusion from the investigation of earnings management around SEOs. He also finds evidence of earnings management prior to the equity offerings; however, he argues that the objective of earnings management prior to the SEO is not to misguide investors but rather to respond rationally to the expected trading in the market at the equity-offering announcement. Investors pool all issuing firms together as firms overstating their earnings and discount firm value accordingly because firms cannot credibly convey information of the absence of earnings management to the capital market. It follows that the issuing firms respond to the expected market behavior by managing earnings upward prior to SEO. He shows that earnings management of the issuing firm is a unique Nash equilibrium. He also shows that the significant negative relation between discretionary accruals prior to SEO and the subsequent future stock return performance documented in both Rangan (1998) and Teoh, et al. (1998b) are not robust to their relatively well-specified research methodologies. He reports that the investors' trading response to the unexpected earnings is significantly weaker in the period subsequent to the announcement of SEOs, suggesting that market participants perceive earnings management through the equity-offering announcement. He also shows that discretionary accruals prior to the SEOs are significantly related to the two-day negative stock price reaction subsequent to the equity issuance announcement. He argues that this relationship implies that investors discount the income-increasing earning manipulation at the issuance announcement.

The accrual anomaly is well documented in accounting literature. Sloan (1996) documents that the accrual component of earnings is overpriced. He examines

whether the information implications about future earnings reflected by the cash flow and accrual components of current earnings are impounded into the equity valuation in a timely manner in the capital market. Bernard and Stober (1989) conclude that there is no systematic difference between the information content of cash flows and accruals. In contrast, Sloan (1996) documents that the information content of the cash flow component of earnings is different from the information content of the accrual component of earnings. He shows that the persistence of current earnings is positively related to the magnitude of the cash flow component of current earnings and negatively related to the magnitude of the accrual component of current earnings. Furthermore, he shows that the implications for future earnings reflected by the current earnings are not fully incorporated into the stock price. He classifies his sample firms into ten deciles based on the ranking of accruals. He shows that a hedge portfolio consisting of a long position in stocks in the lowest deciles of accruals and a short position in stocks in the highest deciles of accruals experience significant positive size-adjusted abnormal returns of 10.4% in the first year, 4.8% in the second year and 3.8% in the third year. He also reports that the lower (higher) future returns of stocks with higher (lower) levels of accruals concentrates around earnings announcements in the future.

Xie (2001) extends the Sloan's (1996) study by examining whether the discretionary component of accruals is mispriced. He follows DeFond and Jambalvo (1994) and Subramanyam (1996) and estimates discretionary accruals using the cross-sectional Jones (1991) model. The result indicates that the market overestimates the persistence of the discretionary component of accruals and thus overprices

discretionary accruals. Moreover, he shows that the overpricing of discretionary accruals is more severe than overpricing of normal accruals. He conducts two tests in his study. First, the result from the Mishikin (1983) test provides evidence that the valuation coefficient on discretionary accruals is significantly larger than the forecasting coefficient of discretionary accruals, suggesting the overvaluation of the discretionary accruals by the capital market. The overpricing of normal accruals is less severe than the discretionary accruals counterpart. Second, the hedge portfolio test indicates that hedge portfolio going long in the lowest deciles of discretionary accruals and going short in the highest deciles of discretionary accruals generates significantly positive abnormal returns in subsequent years. This result suggests that discretionary accruals are overvalued in the year that the hedge portfolio is formed. The hedge portfolio test does not provide any evidence of the overvaluation of normal accruals. He concludes that the mispricing of total accruals documented in Sloan (1996) is driven primarily by the overpricing of discretionary accruals. His findings also extend Subramanyam (1996)'s study by providing empirical evidence that the market not only prices discretionary accruals but also overprices discretionary accruals.

DeFond and Park (2001) further examine the role of accounting accruals in stock valuation. They provide evidence that the market does not fully adjust for the future reversal of discretionary accruals at the earnings announcement date. Specifically, their result shows that firms with both good news and income-decreasing discretionary accruals experience significantly higher cumulative abnormal returns than firms with both good news and income-increasing

discretionary accruals over the period of 80 days after the earnings announcement. The result also indicates that firms with both bad news and income-decreasing discretionary accruals have significantly higher cumulative abnormal returns than firms with both bad news and income-increasing discretionary accruals over the same time periods. Their study attributes the overpricing of discretionary accruals to the market's under-expectation of the future reversal of discretionary working capital accruals. This is consistent with Xie's (2001) conclusion that the overpricing of discretionary accruals is driven by the overestimation of the persistence of discretionary accruals.

Collins and Hribar (2000) extend Sloan's (1996) study by empirically examining whether the accrual anomaly on an annual basis holds on a quarterly basis and whether the accrual anomaly is different from post-earnings announcement drift. Post-earnings announcement drift is a well-documented market anomaly under the Efficient Market Hypothesis (EMH). Stock prices tend to drift upward for positive quarterly earnings surprises and downward for negative quarterly earnings surprise in the post-earning announcement period. Bernard and Thomas (1989) document that a hedge portfolio formed by taking a long position in stocks in the highest unexpected earnings deciles and a short position in stocks in the lowest unexpected deciles generates an estimated abnormal return of approximately 4.2% for 60 days subsequent to the earnings announcement. The annualized abnormal return resulting from the drift is 18%. Ball and Bartov (1996) document that investors systematically underestimate the magnitude of serial correlation of the earnings surprise and respond to the portion of earnings surprises that have been predictable based on the time-

series of earnings in the past at the subsequent earnings announcement. It follows that stock prices fail to incorporate the information of current quarterly earnings for future earnings. Collins and Hribar (2000) examine the accrual anomaly using quarterly earnings data to compare the accrual-based anomaly with the earnings-based anomaly. They find that the market overestimates the persistence of the accrual component of quarterly earnings and thus systematically overprices accruals. Their result shows that accrual mispricing is distinct from the post-earnings announcement drift anomaly. They also show that a trading strategy that uses both an earnings-based anomaly and an accrual-based anomaly generates larger abnormal returns than those that can be generated using a trading strategy that takes advantage of each individual anomaly only. Specifically, a trading strategy that takes a long (short) position in stocks with extreme positive unexpected earnings and extreme negative (positive) accruals generates abnormal returns which almost doubles the abnormal returns generated by trading on each anomaly only over the following two quarters.

Chambers (1999) documents significant market mispricing related to earnings management. He argues that accounting earnings provide value-relevant information for investors to make investment portfolio choices and emphasizes that the extent of persistence of accounting earnings affects investors' stock valuations. He posits that opportunistic earnings management makes earnings fail to reflect the persistence of economic performance of the underlying firm and the real earnings generating capacity of a firm. He demonstrates that investors who cannot identify the managed portion of reported earnings are likely to overvalue firms with income-increasing earnings management and undervalue firms with income-decreasing

earnings management because the extent of persistence of overall earnings will be either overestimated or underestimated. He uses discretionary accruals as a proxy for earnings management. The result suggests that firms that engage in earnings management are temporarily mispriced in the market and invested capital is misallocated.

The mispricing of the accrual component of earnings and the discretionary component of accruals from the empirical studies discussed above suggests that investors do not see through earnings management. Investors fail to discount the earnings with high accruals. Firms with high accruals are likely to have lower future returns. Recent studies investigate whether extensive accounting information users can detect earnings management. Financial analysts are a large group of professionals that use accounting information intensively. They play an important role as an information intermediary. They expend resources in information acquisition and processing and provide information about securities to investors to facilitate their investment decisions. Teoh and Wong (1999) examine whether financial analysts can detect earnings management by investigating whether financial analysts incorporate the predictable future earnings decline for firms with high accruals into their forecast. They find that discretionary accruals in the equity issue year significantly explain analyst annual earnings forecast errors up to four years after the new issue. They further categorize analysts into affiliated and unaffiliated groups and find that both groups are credulous about discretionary accruals. They conclude that financial analysts do not see through earnings management using discretionary

accruals and their biased assessments of issuers' accruals leads to overoptimism in the equity issuance.

Bradshaw, Richardson, and Sloan (2001) examine two information intermediaries to see whether they can provide information about the subsequent earnings problem associated with high accruals in current earnings. First, they examine the forecast behavior of sell-side financial analysts and find that their forecast errors are large and negative for firms with high level of accruals. This is consistent with the notion that analysts do not anticipate future earnings decreases for high accrual firms. They provide two possible explanations for their result: (1) analysts lack sophistication and skills to fully understand the information content of current earnings with high accruals; and (2) sell-side analysts collude with management to inflate future earnings expectations. Their explanations are consistent with other studies that report that management engages in earnings manipulation through discretionary accruals to boost stock prices around some corporate events such as SEO. Second, they analyze auditor behavior by examining the audit opinion and auditor turnover for firms with high accruals. They show that firms with unusually high accruals are more likely to experience decreases in future earnings and SEC enforcement actions for Generally Accepted Accounting Principles (GAAP) violations. However, they do not find supporting evidence that auditors provide an early warning to investors regarding the subsequent earnings decline and the increased probability of GAAP violation for these high accrual firms. There is neither an increase in the frequency of modified auditor opinion nor an increase in the auditor turnover rate. They conclude that neither the sell-side financial analysts nor

the independent auditors provide investors with information on the future earnings implications of firms with high accruals.

Richardson (2003) investigates overall short selling activities motivated by various reasons and finds no systematic evidence that short sellers anticipate lower future returns on the stocks with high total accruals based on the accounting information disclosed in the annual report. Specifically, he examines a sample of NYSE, AMEX, and NASDAQ firms over the period from 1980 to 1998 and finds high accruals firms experience subsequent lower returns. However, his result shows that short sellers trade in both high accruals firms and low accruals firms. He concludes that short sellers do not take the opportunity of earning one-year ahead 8% abnormal returns by switching from going short in low accrual firms to going short in high accrual firms. Further analysis shows that short sellers trade actively in glamour stocks but fail to see through the future earnings problems of high accrual firms.

3. DEVELOPMENT OF HYPOTHESES

Short selling allows short sellers to profit from a decrease in a security's price by selling an asset he (she) does not own and purchasing it at a lower price later to cover the short position. In this study, I investigate whether a sophisticated group of investors, speculative short sellers, can detect earnings management. Prior literature in short selling provides evidence that short sellers are sophisticated investors. They succeed at identifying mispriced stocks using their knowledge, information, and talents. Among all short sellers, speculative short sellers are highly motivated to detect earnings management because they can profit from current earnings' implication of lower future returns for firms with high total accruals and large income-increasing discretionary accruals. Firms with high total accruals are likely to experience lower future returns (Sloan 1996). In addition, firms that engage in earnings management through large income-increasing discretionary accruals are likely to be overvalued by the market and thus experience lower future returns (Xie 2001). Speculative short sellers go short in overpriced stocks with high total accruals or large income-increasing discretionary accruals and cover their short positions when the stock price subsequently drops. In this study, I focus on the trading activities of speculative short sellers to examine whether they can detect earnings management.

The motivation for short selling activity can be viewed from three perspectives. First and foremost, short sellers engage in short selling activity for speculative purposes. In other words, investors who short sell for speculative purpose

expect to profit from a decline in the security price. A survey conducted in 1947 reports that two-thirds of total short selling is motivated by speculation.

Second, short selling may be an essential component of hedging and arbitrage strategies. Investors may earn an arbitrage profit by taking a relevant position in an additional security that is connected to the value of the underlying stock. These additional securities include an option on the underlying stock, a convertible bond or convertible preferred stock, stock index futures, and other financial instruments whose value is linked to the market price of the underlying stock. McDonald and Baron (1973) document that arbitrage and hedging play an important role in explaining short selling activity. They argue that stocks with a higher return volatility have a higher level of short interest because hedging can motivate short sales. Their empirical analysis shows that short interest is positively related to beta.

Option trading has two opposite effects on short interest. Investors with unfavorable information on a security and who are either prohibited from short selling or prefer not to sell short for various reasons, may switch to purchasing a put option on the security. It follows that there could be a substitution effect between taking a long position in a put option and going short. However, the option market makers may increase their short positions in the underlying security to hedge their position. Thus, short interest increases with the introduction of the traded options on the underlying security. Figlewski and Webb (1993) present evidence that options facilitate short selling and enhance information efficiency of the market. They find that stocks with traded options have higher average levels of short interest than stocks

without traded options. They also show that short selling activity for an individual stock increases after option listing. Options improve transaction efficiency by providing investors who are constrained to sell short an opportunity to purchase a put option or write a call option as an alternative to sell short the security directly. In addition, options enhance the information efficiency of the market because that short sale restriction makes unfavorable information under-represented in the stock price in the market. Asquith and Meulbroek (1995) find that firms with large short positions are likely to be firms with listed options. They document that a group of heavily shorted firms have a higher portion of traded call options than a group of randomly selected firms.

Risk arbitrage literature indicates that short selling can be related to merger activity. Specifically, Mitchell and Pulvino (2001) and Cornelli and Li (2002) document that short selling is a part of the investment strategy of risk arbitrageurs. In the case of a stock merger, the stock price of a target firm is typically traded at a discount to the acquirer's offer price after the announcement date of a merger. The arbitrage spread refers to the difference between the acquirer's offer price and the target's stock price. Risk arbitrageurs (merger arbitrageurs) attempt to earn a profit from this spread. In a stock merger, risk arbitrageurs lock in the spread by going long in the stock of a target firm and going short in the stock of an acquirer.

Third, short sales can be motivated by tax reasons. "Short sales against the box" are one type of short selling activity in which investors short sell a security that he/she holds a long position. Prior to June 1997, a short sale against the box enabled an investor to lock in a profit without recognizing the related capital gains tax

immediately. This ability to defer capital gains tax was beneficial to investors especially when investors were taxed at a lower rate in the following tax period. Dyl (1978) develops an analytical framework in which a short seller faces a trade-off between the benefits from the delayed recognition of capital gains tax and the cost of the unavailability of sales proceeds. He suggests that the length of time that a short position is open, the current and future tax rate for the investor, and the size of the capital gain all affect an investor's decision to short sale against the box. He argues that an investor who engages in short sales against the box follows a "minimum cost strategy" by increasing short selling at the end of the tax year and covering the short position early in the subsequent year such that he/she can keep the time of the open short position short. If an investor follows this strategy, we expect an increase in short interest in December and a decrease in short interest in the following January. Brent, et al. (1990) find that an average increase in the aggregate market short interest is largest (5.45%) in December and an average aggregate market short interest decreases significantly (-6.12%) in January in the following year.

The Taxpayer Relief Act of 1997 (henceforth TRA1997) eliminates this tax loophole. TRA1997 classifies short sales against the box as constructive sales; therefore, an investor who adopts a short sale against the box trading strategy can no longer defer the capital gains tax, but recognize the related taxable gain immediately. Arnold, et al. (2002) examine the impact of TRA1997 on the information content of short interest and find that short interest conveys more bearish information after TRA1997 for a large sample of NYSE firms. Their empirical result is consistent with the Diamond and Verrecchia (1987) model.

I hypothesize that only speculative short selling is informative. Speculative short sellers are sophisticated investors that are well informed. They have skills, expertise, and ability to conduct fundamental analysis and identify securities that are overvalued by the capital market. Firms that are heavily shorted by speculative short sellers experience lower future returns. In contrast, short sales for arbitrage, hedging, and tax purposes are non-informative. I refer to this non-information motivated short selling as non-speculative trading in the short selling market. Richardson (2003) does not distinguish between speculative short sellers from short sellers motivated by other reasons such as arbitrage, hedging, and tax purposes. Using the total short selling activities for a specific security instead of focusing on short selling motivated by speculative purpose only introduces noise in the empirical examination of the relationship between short sellers and earnings management. Hence, unlike Richardson (2003), my study focuses on speculative short selling only.

Speculative short selling is information based short selling activity. I control for non-information based short selling by constructing a few control variables. Specifically, I use a dummy variable (Option Dummy) to indicate whether the security has a traded option, a dummy variable (Convertible Dummy) to indicate whether the security has convertible debt or convertible preferred stock, and a dummy variable (Merger Dummy) to indicate whether there is a stock merger announcement in which the sample firm is an acquirer. These variables are used to control for short selling activity for hedging and arbitrage purposes.

Diamond and Verrecchia (1987) document that short sellers are more likely to be informed traders because short selling incurs higher costs than selling outright.

Moreover, short selling has more restrictions than a direct sale. They characterize short interest as a bearish indicator. Their model predicts that an increase in the costs of short selling increases the bearish information content of the short interest. Recent empirical studies provide supporting evidence that short interest conveys negative information on the underlying security. Dechow, et al. (2001) document that short sellers target overpriced stocks reflected by the low ratios of fundamentals to market values and cover their short positions as the ratios revert. Speculative short sellers are informed investors who bet the decrease in stock price and thus profit from the price difference accordingly.

The accrual anomaly is well documented in accounting literature. Specifically, Sloan (1996) documents that the accrual component of earnings is overpriced. His evidence suggests that investors underestimate the persistence of the cash flow component of current earnings and overestimate the persistence of the accrual component of current earnings. The prospect of future earnings conveyed by the current earnings of the firm does not fully impound into the stock price promptly. Firms with high total accruals tend to experience negative future abnormal stock returns. Hedge portfolios yield significantly positive size-adjusted abnormal returns in the following three years after the portfolio formation date.

Xie (2001) further decomposes total accruals into its discretionary accruals and non-discretionary accruals components and examines whether the two components are mispriced. He demonstrates that the discretionary component of accruals is overpriced and this overpricing contributes greatly to the mispricing of total accruals.

Collins and Hribar (2000) extend Sloan's (1996) study by empirically examining whether there is an accrual anomaly using quarterly earnings data. They provide evidence that the market systematically overprices (underprices) the accrual (cash flow) component of quarterly earnings. They also find that the accrual (cash flow) mispricing is distinct from the post-earnings announcement drift anomaly. Their study focuses on total quarterly accruals only.

In this study, I use both quarterly earnings data and annual earnings data to empirically investigate whether speculative short sellers can detect earnings management. First, I examine whether short sellers utilize information in the total accrual component of earnings. Second, I decompose total accruals into its discretionary and non-discretionary components and examine whether short sellers can detect earnings management by targeting stocks with large income-increasing discretionary accruals. I predict that securities with both high total accruals and income-increasing discretionary accruals have lower future returns. I hypothesize that speculative short sellers are informed and exploit the accrual anomaly by trading on the information content of the mispriced total accruals. In addition, I hypothesize that speculative short sellers are sophisticated enough to distinguish between the discretionary and non-discretionary components of accruals and exploit the overvaluation of the discretionary component by targeting stocks with large income-increasing discretionary accruals. In sum, I hypothesize that sophisticated short sellers can detect income-increasing earnings management. My hypotheses stated in the alternative forms are as follows:

H1: Speculative short interest is positively related to quarterly total accruals.

H2: Speculative short interest is positively related to quarterly discretionary accruals.

H3: Speculative short interest is positively related to total accruals.

H4: Speculative short interest is positively related to discretionary accruals.

4. SAMPLE SELECTION, DESCRIPTIVE STATISTICS, VARIABLE DEFINITIONS

4.1 Sample Selection

My empirical analysis centers on the relationship between short interest and both quarterly earnings and annual earnings of NYSE firms. It follows that the data in this study include two samples. The first sample consists of all firm-quarter observations while the second sample consists of all firm-year observations. The final sample of all firm-quarter (firm-year) observations has to meet the following criteria:

- (1) The firm has reported monthly short interest data for June, September, and December in the current year and April in the following year. The monthly short interest data is compiled by the NYSE.
- (2) The firm has fiscal-year end of 12/31.
- (3) The firm has available annual or quarterly accounting data from Research Insight such as earnings, dividend, and other information required for estimation of non-discretionary accruals (discretionary accruals).
- (4) Firms are non-financial NYSE firms. Firms with two-digit SIC code between 60 and 67 are excluded.
- (5) The firm has stock return information and the number of shares outstanding information from *the Center for Research in Security Price (CRSP)* database over the period of 1992-1999.

Tables 1 and 2 report the sample selection process and its influence on the final sample size for quarterly and annual data respectively. For the quarterly data, I first obtain data of short selling activity from the short interest database compiled by NYSE. The monthly short interest data that matches fiscal quarters includes 86,410 firm-quarter observations. I exclude firms whose fiscal-year end is not December and sample is reduced to 35,051. I further eliminate firm-quarter observations for which discretionary accruals cannot be estimated using the cross-sectional modified Jones model due to insufficient accounting information from the Research Insight database. I also exclude financial service firms that have a two-digit SIC code between 60 and 67, inclusive. Finally, I exclude observations that lack information on stock returns and the number of shares outstanding from CRSP. The final sample consists of 11,537 firm-quarter observations. Similarly, for the annual data, all selection criteria bring the final sample to 5,118 firm-year observations for 1,146 firms.

The quarterly accounting data from Research Insight is available only after 1991. My sample period ranges from 1992 to 1999. Short interest from June 1992 through April 1999 is obtained from *the New York Stock Exchange (NYSE)*. NYSE compiles short interest data monthly based on the short positions held as of settlement on the 15th of each month. The corresponding trade date is the eighth of each month. For example, short interest data for April 1999 corresponds to the short interest over the period from the ninth of March 1999 to the eighth of April 1999. The short interest data compiled by NYSE is advantageous because it includes all firms traded on NYSE. There is no selection bias involved. Prior studies in short sale uses short sale data reported in newspapers such as *the Wall Street Journal*. Short sale data

Table 1 Sample Selection for Quarterly Data

Sample Selection Criteria	Firm-quarter Observations	Number of Observations in the Sample
Observations for which short interest data is available	86,410	86,410
Less: Observations for which the firm has non-December fiscal year end	(51,359)	35,051
Less: Observations for which discretionary accruals cannot be estimated using cross-sectional modified Jones model due to unavailability of data from Research Insight	(20,477)	14,574
Less: Observations that are financial service firms	(1,376)	13,198
Less: Observations without available stock returns and the number of shares outstanding data from CRSP	(1,661)	11,537

Observations by Quarter

First Quarter	2,664
Second Quarter	2,656
Third Quarter	2,725
Fourth Quarter	3,492

Observations by Year

1992	1,143
1993	1,160
1994	1,358
1995	1,603
1996	1,901
1997	2,106
1998	2,266

Table 2 Sample Selection for Annual Data

Sample Selection Criteria	Firm-year Observations	Number of Observations in the Sample
Observations for which short interest data is available	22,312	22,312
Less: Observations for which the firm has non-December fiscal year end	(13,119)	9,193
Less: Observations for which discretionary accruals cannot be estimated using cross-sectional modified Jones model due to unavailability of data from Research Insight	(2,957)	6,236
Less: Observations that are financial service firms	(680)	5,556
Less: Observations without available stock returns and the number of shares outstanding data from CRSP	(438)	5,118

Observations by Year

1992	504
1993	555
1994	664
1995	739
1996	807
1997	883
1998	966

from this source is incomplete. Newspaper typically discloses short sale information only for firms that have large short positions or firms that have a large change in short interest. The reporting criteria depend on the assessment of “large”, which varies across time. For example, from October 1992 to September 1993, *the Wall Street Journal* reports short sales for firms with more than 150,000 shares to be sold short or short position changes by at least 50,000 from the previous month whereas in August 1995, *the Wall Street Journal* reports short sales for firms with more than 300,000 shares have been sold short or the number of shares sold short changes by more than 50,000 from the last month (Asquith and Meulbroek 1995). It follows that firms whose short position does not meet the reporting criteria will not appear in the newspaper even though the relative short interest (short interest divided by the number of shares outstanding) may be very high. Thus, research based on short interest data from the news source is biased against these firms. Using the complete short sale data compiled by *NYSE* eliminate selection bias that may arise using short interest data from news source.

The accounting data are from the Standard and Poor’s *Research Insight* database, and the stock price and return information is from *the Center for Research in Security Price (CRSP)* database. *Options Clearing Corporation* provides information on whether the stocks have traded options. I obtain information on which stocks have convertible securities from the *Research Insight* database. The stock merger data are extracted from the merger and acquisition database from the Securities Data Company (SDC). Data sources are demonstrated in Table 3.

Table 3
Variable Definitions and Data Sources

This table presents definitions and data sources of the dependent variable, independent variables and control variables used in the study.

Variables	Specification	Source
Relative Short Interest	Short interest divided by the number of shares outstanding	Short interest data compiled by <i>NYSE</i>
Total Accruals (Quarter)	Difference between quarterly earnings before extraordinary items and quarterly cash flows from operations scaled by the total assets at the beginning of the quarter	Research Insight
Total Accruals (Annual)	Difference between annual earnings before extraordinary items and annual cash flows from operations scaled by the total assets at the beginning of the fiscal year	Research Insight
Discretionary Accruals (Quarter)	Difference between quarterly total accruals and the non-discretionary quarterly accruals estimated using adapted cross-sectional modified Jones model	Research Insight
Discretionary Accruals (Annual)	Difference between annual total accruals and the non-discretionary annual accruals estimated using cross-sectional modified Jones model	Research Insight
Option Dummy	Dummy variable whose value is set to 1 if the stock has a traded option and zero otherwise	Options Clearing Corporation

Table 3 –Continued

Convertible Dummy	Dummy variable whose value is set to 1 if the stock has a convertible debt or convertible preferred stock	Research Insight
Merger Dummy	Dummy variable whose value is set to 1 if the firm is an acquirer in a stock merger during the given month.	Securities Data Corporation
Ln (Volume)	The natural logarithm of one plus the average daily trading volume	Short interest data compiled by <i>NYSE</i>
Ln (SIZE)	The natural logarithm of firm size calculated as the sum of market value of common stock and the book value of debt and the preferred stock	Research Insight
Dividend Yield	Quarterly or annual dividend yield	Research Insight
Stock Return	Stock return compounded from the 9 th of the previous month to the 8 th of the current month	CRSP
Market Return	CRSP value-weighted return compounded from the 9 th of the previous month to the 8 th of the current month	CRSP

4.2 Sample Industry Distribution

Table 4 reports the industry distribution of sample firms. The industry composition is based on the annual data. The sample includes 1,146 firms from 52 industries classified by the two-digit SIC code. The large number of industry classification suggests the sample firms are representative of the universe of the industry. The relative large group of firms are from mining industry (SIC code 10, 13, 14), electric, gas and sanitary services (SIC code 49) and service industry (SIC code 70-87).

4.3 Descriptive Statistics

Table 5 reports descriptive statistics of the variables of interest for a full sample of 11,537 firm quarters for non-financial NYSE firms over the period of 1992-1999. The mean and median size of the firm is 6,776 and 1,606 million dollars respectively. Firm size has a minimum value of \$19 million and a maximum value of \$509,278 million. In this study, I use the natural logarithm of the sum of the market value of common stock and the book value of debt and preferred stock to control for firm size.

NYSE reports short interest data covering more than 3,000 firms on average in the sample period except 1992 and 1993. In this study, I include all firms in the NYSE short interest report in a given month with available quarterly accounting data from Research Insight and stock return data from CRSP. The short interest in a given month ranges from zero to 42.6% of outstanding shares. The mean (median) short position as a percentage of the number of shares outstanding is 1.73% (0.78%).

Table 4 Sample Composition by Industry

This table reports the industry distribution of the 1,146 firms.

Industry	Number of Firms	SIC code	Percentage
Mining	109	10,13,14	9.51
Construction	17	15,16,17	1.48
Food and Kindred Products	28	20	2.44
Textile Products	17	22, 23	1.48
Lumber and Wood Products, Furniture	23	24,25	2.01
Paper and Allied Products	34	26	2.97
Printing and Publishing	28	27	2.44
Chemical and Allied Product	93	28	8.12
Petroleum and Coal	29	29	2.53
Plastic and Leather Products	25	30, 31	2.18
Stone, Clay, Glass and Concrete Products	18	32	1.57
Metal	77	33, 34	6.72
Industrial and Commercial Machinery and Computer Equipment	65	35	5.67
Electric Equipment and Components	56	36	4.89
Transportation Equipment	39	37	3.40
Measurement, Analyzing, Control Instrument and related Product	34	38	2.97
Miscellaneous Manufacturing	10	39	0.87
Transportation Service	37	40,42,44,45,47	3.23
Communications	50	48	4.36
Electric, Gas & Sanitary Services	134	49	11.69
Whole Sale Trade	35	50,51	3.05
Retail Trade	42	52-59	3.66
Services	139	70-87	12.13
Public Administration	7	99	0.61
Total	1,146		100

Table 5 Descriptive Statistics (Quarterly Data)

This table reports the summary statistics of the dependent (independent) variables for the full sample of firm quarter observations from 1992 to 1999.

Variables	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Relative Short Interest	0.0000	0.0029	0.0173	0.0078	0.0181	0.4259	0.0290
Discretionary Accruals	-1.4857	-0.0823	-0.0414	-0.0148	0.0204	0.9807	0.1243
Total Accruals	-1.4818	-0.1380	-0.0766	-0.0569	-0.0044	0.9984	0.1179
Convertible Dummy	0.0000	0.0000	0.1435	0.0000	0.0000	1.0000	0.3505
Option Dummy	0.0000	0.0000	0.5610	1.0000	1.0000	1.0000	0.4963
Volume	11.0000	21,118	282,357	86,619	281,395	18,928,031	610,018
Ln(Volume)	2.4849	9.9579	11.0628	11.3693	12.5475	16.7562	2.1377
Size	19.0150	568.0250	6,775.5457	1,605.9190	4,791.2610	509,278	20,493
Ln(Size)	2.9452	6.3422	7.4605	7.3815	8.4746	13.1408	1.5854
Dividend Yield	0.0000	0.0000	0.0047	0.0035	0.0068	1.4271	0.0149
Merger Dummy	0.0000	0.0000	0.0062	0.0000	0.0000	1.0000	0.0782
Stock Return	-0.5195	-0.0459	0.0073	0.0078	0.0598	1.4354	0.1024
Market Return	-0.0778	-0.0055	0.0129	0.0218	0.0434	0.0530	0.0354

Figure 1 shows the distribution of the average relative short interest in June, September, December, and April in each year from 1992 to 1999. Short interest reaches the maximum in April 1998. The average relative short interest is 2.17% for sample firms in April 1998.

The summary statistics show that 56.10% of firm-quarter observations have traded options. In addition, 14.35% of the firm-quarter observations have convertible securities in the form of either convertible debt or convertible preferred stock. Among all firm-quarter observations, 0.6% of firms announced a stock merger in which firms are acquirers in the month of June, September, and December in the current year and April in the following year. The mean and median values of the quarterly dividend yield (dollar dividends divided by the market value by the end of the fiscal quarter) are 0.47% and 0.35% respectively. On average, the stock return from the ninth of the previous month to the eighth of the current month is 0.73%; the relevant market index return over the same period is 1.3%. The distribution of the average daily trading volume varies greatly across firm-quarters with a minimum of 11 and a maximum of 18,928,031. I measure trading volume as the natural logarithm of one plus the average trading volume to mitigate the skewness. The mean and the median of total quarterly accruals are -0.077 and -0.057 respectively. Discretionary accruals range from -1.49 to 0.98 with a mean (median) value of -0.04 (-0.015).

Table 6 reports summary statistics for a sample of 5,118 firm-year observations for non-financial NYSE firms over the period of 1992-1999. Firm size has a minimum value of \$3.36 million and a maximum of \$508,713 million. The average size of the firm is \$6,865 million. The distribution of average daily trading

Relative Short Interest Over the Sample Period 1992-1999

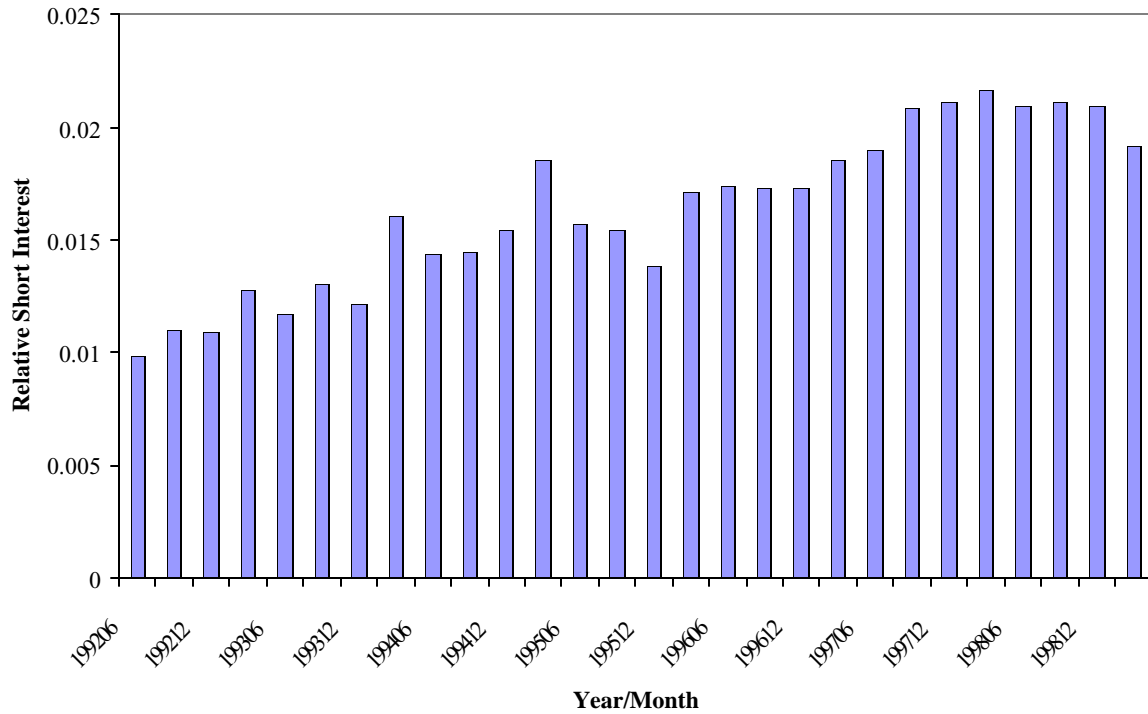


Figure 1 Average Relative Short Interest over the Sample Period of 1992-1999

Table 6 Descriptive Statistics (Annual Data)

This table reports the summary statistics of the dependent (independent) variables for the full sample of firm year observations from 1992 to 1999.

Variables	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Relative Short Interest	0.0000	0.0026	0.01849	0.0080	0.0187	0.8337	0.0359
Discretionary Accruals	-1.5291	-0.0273	0.0102	0.0082	0.0465	5.8539	0.1358
Total Accruals	-1.4242	-0.0835	-0.0549	-0.0509	-0.0218	0.8504	0.0900
Convertible Dummy	0.0000	0.0000	0.1331	0.0000	0.0000	1.0000	0.3397
Option Dummy	0.0000	0.0000	0.4912	1.0000	1.0000	1.0000	0.5000
Volume	9.0000	19,680	282,985	85,140	277,977	18,928,031	650,201
Ln(Volume)	2.3026	9.8874	11.0486	11.3521	12.5353	16.7562	2.1510
Size	3.3630	586.7350	6,865.2615	1,759.3750	5,221.9620	508,713	19,413
Ln(Size)	1.2128	6.3746	7.5050	7.4727	8.5606	13.1396	1.6225
Dividend Yield	0.0000	0.0000	0.0208	0.0143	0.0302	1.6692	0.0341
Merger Dummy	0.0000	0.0000	0.0035	0.0000	0.0000	1.0000	0.0592
Stock Return	-0.4943	-0.0467	0.0130	0.0045	0.0606	1.4354	0.1114

volume is highly skewed with mean and median of 282,985 and 85,140 respectively. The relative short interest in April following each fiscal year end from 1992 to 1998 ranges from zero percent to 83.37% of the number of shares outstanding at the time when short interest is measured. On average, short interest is 1.8% of the number of shares outstanding. The dividend yield at fiscal year end has mean and median of 2.08% and 1.43% respectively. Total accruals have a mean and median of -0.055 and -0.051 whereas discretionary accruals have a mean and median of 0.01 and 0.008 respectively. Table 6 indicates that 49% of the firm-year observations have a traded option and 13% have either convertible debt or convertible preferred stock. The statistics also show that 0.35% of the annual data are involved in a stock merger in which the firm is an acquirer with an announcement date falling into the period from March 9th to April 8th in the years 1993 to 1999. On average, the contemporaneous return on the stock is 1.3% with a minimum return of -49.43% and a maximum return of 143.54%.

5. RESEARCH DESIGN AND MODEL

5.1 Research Design

My analysis of both quarterly and annual data consists of two parts. In the first part, I estimate discretionary accruals as a proxy for earnings management. In the second part, I utilize multivariate regression models to examine whether short sellers can identify the income-increasing earnings management through discretionary accruals and the information content of total accruals.

5.2 Discretionary Accruals Estimation for Quarterly Data

I estimate quarterly accruals as the difference between quarterly earnings before extraordinary items (Research Insight Item #8) and quarterly cash flows from operations³ scaled by total assets at the beginning of the quarter. I measure earnings management through discretionary accruals by employing the cross-sectional modified Jone's model adapted on a quarterly basis. This measurement is consistent with the earnings management estimation documented in Balsam, et al. (2002). The discretionary accruals model was advocated by Jones (1991), developed using a cross-sectional approach by DeFond and Jiambalvo (1994) and modified by Dechow, et al. (1995). Discretionary accruals are measured as the difference between total accruals and non-discretionary accruals. The non-discretionary component of accruals is a two-step estimate. In the first step, I regress total accruals on the change in revenues scaled by total assets at the beginning of the quarter and on gross property, plant, and equipment scaled by total assets at the beginning of the quarter.

³ Research insight reports data from the statement of cash flows on a cumulative basis. For the 2nd, 3rd and 4th quarters of a fiscal year, the cash flows from operation are calculated by taking the difference between cash flows from operations (item #108) for the current quarter and cash flows from operations for the previous quarter.

Firms are categorized into different industry groups based on the two-digit SIC code. I estimate the model separately for each industry group and each fiscal quarter using all firm-quarters with available accounting data, the same two-digit SIC code, and December fiscal year-end. Any industry group with fewer than 10 firms is excluded. In the second step, I calculate non-discretionary accruals based on the parameter estimates from the cross-sectional Jone's model and adjust the change in revenues by the change in receivables (Equation 1).

$$\text{ACCRQ}_{jt} / \text{TAQ}_{jt-1} = \alpha_1 (1 / \text{TAQ}_{jt-1}) + \alpha_2 [(\Delta \text{REVQ}_{jt} - \Delta \text{RECQ}_{jt}) / \text{TAQ}_{jt-1}] + \alpha_3 (\text{PPEQ}_{jt} / \text{TAQ}_{jt-1}) + \varepsilon_{jt} \quad (1)$$

Where ACCRQ = total accruals in the current quarter;

TAQ = total assets at the beginning of the quarter;

?REVQ = change in revenue from the last quarter;

?RECQ = change in receivables from the last quarter;

PPEQ = gross property, plant and equipment in the current quarter.

Quarterly discretionary accruals are measured as the difference between total accruals and non-discretionary accruals scaled by lagged total assets at the beginning of the quarter.

5.3 Model Specification for Quarterly Data

Firms are required to file their 10-Q reports with the SEC within 45 days after the end of the fiscal quarter.⁴ I assume that short sellers conduct fundamental analysis using information in the quarterly financial accounting report when the 10-Q

⁴ Easton and Zmijewski (1993) analyze 193,283 10-Q filings and find that on average, 10-Qs become publicly available 44.7 days after the fiscal quarter.

report becomes publicly available and establish short positions in stocks with high total accruals and large income-increasing discretionary accruals. Thus, I measure the dependent variable (short selling activity) as the relative short interest 45 days after the fiscal quarter-end for a sample of all firm-quarter observations. The relative short interest is defined as short interest divided by the number of shares outstanding on the eighth of that month to match the trade date of the short interest data. The monthly short interest data includes the short selling activity from the ninth of the previous month to the eighth of the current month. Hence, I use the short interest data in the month of June, September, and December in the current year to match the discretionary accruals (total accruals) data in the 1st, 2nd, and 3rd quarters respectively. In addition, firms typically file 10-K report within 90 days after the fiscal year end. Thus, I match relative short interest data in April in the following year with discretionary accruals (total accruals) in the 4th quarter.

I employ quarterly discretionary accruals (total accruals) as the independent variable to examine the relationship between short selling and discretionary accruals (total accruals). I also include other control variables in the regression analysis. Sias and Starks (1997) document that institutional ownership and firm size is correlated. Large firms are likely to have high institutional ownership. Firms with high levels of institutional ownership have more stocks available to be bought and sold short. Thus, I use firm size to control for the availability of shares in the regression. Firm size is measured as the natural logarithm of the sum of market value of the common equity and the book value of total debt and preferred stock. Stocks with high trading volume are more liquid. Graham, et al. (1999) argues that short sellers are more likely to trade

in stocks with lower transaction costs. Short interest is expected to be higher for stocks with high trading volume. I include the natural logarithm of one plus the average daily trading volume from the ninth of the previous month to the eighth of the current month in the regression. As discussed earlier, dividends increase the costs for short sellers. Stocks with higher dividend yields are less likely to be sold short, *ceteris paribus*. I employ quarterly dividend yield as another determinant of short selling activity. I also use the stock return compounded from the ninth of the previous month to the eighth of the current month to control for stock performance. Similarly, my regression includes the CRSP value-weighted market return compounded over the same period to match the trade date of short selling and to control for overall market performance.

In the following analysis, I also control for non-information-based determinants of short selling because this study focuses on information motivated short selling. Previous studies have shown that short selling may be used for hedging and arbitrage purposes; furthermore, stocks with traded options have higher levels of short interest (Brent, et al. 1990; Graham, et al. 1999). I include an option dummy variable to capture the effect of traded options. The value of the option dummy variable is set to 1 if the stock has a traded option and zero otherwise. Brent, et al. (1990) and Graham, et al. (1999) argue that the convertible security holder may engage in short selling for hedging purposes because of the imbedded option on the stock. Thus, I also construct a convertible security dummy variable in my analysis. I also include year dummy variables to control for time specific effect in the models.

Table 3 summarizes the dependent variable, independent variable and other control variables.

The models for all firm-quarter observations are summarized in the following regressions:

Model 1

$$\begin{aligned} \text{Relative Short Interest} = & \mathbf{b}_0 + \mathbf{b}_1 * \text{Discretionary Accruals} + \mathbf{b}_2 * \text{Option Dummy} + \mathbf{b}_3 * \text{Convertible} \\ & \text{Dummy} + \mathbf{b}_4 * \text{Trading Volume} + \mathbf{b}_5 * \text{Dividend Yield} \\ & + \mathbf{b}_6 * \text{Stock Return} + \mathbf{b}_7 * \text{Market Return} + \mathbf{b}_8 * \text{Merger Dummy} \\ & + \sum_{i=93}^{98} \sum_{j=9}^{14} \mathbf{b}_j \text{ Year Dummy}_i + \mathbf{e} \end{aligned}$$

Model 2

$$\begin{aligned} \text{Relative Short Interest} = & \mathbf{b}_0 + \mathbf{b}_1 * \text{Total Accruals} + \mathbf{b}_2 * \text{Option Dummy} + \mathbf{b}_3 * \text{Convertible} \\ & \text{Dummy} + \mathbf{b}_4 * \text{Trading Volume} + \mathbf{b}_5 * \text{Dividend Yield} \\ & + \mathbf{b}_6 * \text{Stock Return} + \mathbf{b}_7 * \text{Market Return} + \mathbf{b}_8 * \text{Merger Dummy} \\ & + \sum_{i=93}^{98} \sum_{j=9}^{14} \mathbf{b}_j \text{ Year Dummy}_i + \mathbf{e} \end{aligned}$$

The models for firm-quarter observations by each fiscal quarter are as follows:

Model 1

$$\begin{aligned} \text{Relative Short Interest} = & \mathbf{b}_0 + \mathbf{b}_1 * \text{Discretionary Accruals} + \mathbf{b}_2 * \text{Option Dummy} + \mathbf{b}_3 * \text{Convertible} \\ & \text{Dummy} + \mathbf{b}_4 * \text{Trading Volume} + \mathbf{b}_5 * \text{Dividend Yield} \\ & + \mathbf{b}_6 * \text{Stock Return} + \mathbf{b}_7 * \text{Merger Dummy} \\ & + \sum_{i=93}^{98} \sum_{j=8}^{13} \mathbf{b}_j \text{ Year Dummy}_i + \mathbf{e} \end{aligned}$$

Model 2

$$\begin{aligned} \text{Relative Short Interest} = & \mathbf{b}_0 + \mathbf{b}_1 * \text{Discretionary Accruals} + \mathbf{b}_2 * \text{Option Dummy} + \mathbf{b}_3 * \text{Convertible} \\ & \text{Dummy} + \mathbf{b}_4 * \text{Firm Size} + \mathbf{b}_5 * \text{Dividend Yield} \\ & + \mathbf{b}_6 * \text{Stock Return} + \mathbf{b}_7 * \text{Merger Dummy} \\ & + \sum_{i=93}^{98} \sum_{j=8}^{13} \mathbf{b}_j \text{ Year Dummy}_i + \mathbf{e} \end{aligned}$$

Model 3

$$\begin{aligned} \text{Relative Short Interest} = & \mathbf{b}_0 + \mathbf{b}_1 * \text{Total Accruals} + \mathbf{b}_2 * \text{Option Dummy} + \mathbf{b}_3 * \text{Convertible} \\ & \text{Dummy} + \mathbf{b}_4 * \text{Trading Volume} + \mathbf{b}_5 * \text{Dividend Yield} \\ & + \mathbf{b}_6 * \text{Stock Return} + \mathbf{b}_7 * \text{Merger Dummy} \\ & + \sum_{i=93}^{98} \sum_{j=8}^{13} \mathbf{b}_j \text{ Year Dummy}_i + \mathbf{e} \end{aligned}$$

Model 4

$$\begin{aligned} \text{Relative Short Interest} = & \mathbf{b}_0 + \mathbf{b}_1 * \text{Total Accruals} + \mathbf{b}_2 * \text{Option Dummy} + \mathbf{b}_3 * \text{Convertible} \\ & \text{Dummy} + \mathbf{b}_4 * \text{Firm Size} + \mathbf{b}_5 * \text{Dividend Yield} \\ & + \mathbf{b}_6 * \text{Stock Return} + \mathbf{b}_7 * \text{Merger Dummy} \\ & + \sum_{i=93}^{98} \sum_{j=8}^{13} \mathbf{b}_j \text{ Year Dummy}_i + \mathbf{e} \end{aligned}$$

5.4 Discretionary Accruals Estimation for Annual Data

Many accounting researchers attempt to develop an adequate accrual model to capture earnings management through discretionary accruals. Several studies have developed time-series discretionary accrual models (e.g. Healy 1985; DeAngelo 1986; Jones 1991; Dechow and Sloan 1991; Dechow, et al. 1995). Among these five accrual models, the Jones and the Modified Jones model are widely used because they are better specified and are more powerful.

Time-series models require continuous observations for a given firm over several years and thus impose an assumption of stationarity on the series. Recent studies overcome the restrictions of time-series models by switching to across-sectional variation of the model. DeFond and Jiambalvo (1994) and Subramanyam (1996a) develop a cross-sectional Jones model. They argue that this cross-sectional

estimation mitigates the survivorship bias and increases the precision of estimates due to larger sample sizes. However, the principal disadvantage of the model is ignorance of the variation in parameter estimates. Bartov, et al. (2001) provides evidence of the superior performance of the cross-sectional Jones and modified Jones models to their time-series counterparts in the context of audit qualification.

I employ the cross-sectional version of the modified Jones model to estimate discretionary accruals because it is the most widely used accrual model in the extant earnings management literature. Specifically, I calculate total accruals as the difference between earnings before extraordinary items and the cash flows from operations divided by total assets at the beginning of the year. Total accruals are regressed on the change in revenues scaled by total assets at the beginning of the year and gross property, plant, and equipment scaled by total assets at the beginning of the year. The model is estimated for each fiscal year using all firm-year observations with the same two-digit SIC code and December fiscal year end. I exclude firm-year observations whose industry category has fewer than 10 firms with the required information for estimation. Discretionary accruals are the residuals of the model after making an adjustment by subtracting the change in receivables from the change in revenues. The model after adjustment is presented in the following equation:

$$ACCR_j / TA_{j-1} = a_1 (1 / TA_{j-1}) + a_2 [(\Delta REV_j - \Delta REC_j) / TA_{j-1}] + a_3 (PPE_j / TA_{j-1}) + e_j \quad (2)$$

Where ACCR = total accruals in the current year;

TA = total assets at the beginning of the year;

?REV = change in revenue from the last year;

ΔREC = change in receivables from the last year;

PPE = gross property, plant and equipment in the current year.

5.5 Model Specification for Annual Data

The SEC requires that firms file 10-K reports within 90 days after the fiscal year-end. Alford, Jones, and Zmijewski (1994) report that more than eighty percent of firms file their 10-K reports within this required period. Hence, I measure short selling activity as relative short interest three months after the fiscal year-end for a sample of all firm-year observations.

The dependent variable is relative short interest from March 9 to April 8 in the subsequent year. In model 1, I employ discretionary accruals estimated from the annual data as the independent variable. The control variables include the natural logarithm of one plus the average daily trading volume from March 9 to April 8 in the following year, the contemporaneous stock return over the same period, stock dividend yield, a merger dummy variable to control for the risk arbitrage in stock merger, an option dummy variable, a convertible dummy to control for short selling for arbitrage and hedging purpose, and the year dummy variables to control for time specific effect. In model 2, total accruals are used as independent variable and the other control variables are the same as those in model 1. The following regressions represent these two models:

Model 1

$$\begin{aligned} \text{Relative Short Interest} = & \mathbf{b}_0 + \mathbf{b}_1 * \text{Discretionary Accruals} + \mathbf{b}_2 * \text{Option Dummy} + \mathbf{b}_3 * \text{Convertible} \\ & \text{Dummy} + \mathbf{b}_4 * \text{Trading Volume} + \mathbf{b}_5 * \text{Dividend Yield} \\ & + \mathbf{b}_6 * \text{Stock Return} + \mathbf{b}_7 * \text{Merger Dummy} \\ & + \sum_{i=93}^{98} \sum_{j=8}^{13} \mathbf{b}_j \text{ Year Dummy}_i + \mathbf{e} \end{aligned}$$

Model 2

$$\begin{aligned} \text{Relative Short Interest} = & \mathbf{b}_0 + \mathbf{b}_1 * \text{Total Accruals} + \mathbf{b}_2 * \text{Option Dummy} + \mathbf{b}_3 * \text{Convertible} \\ & \text{Dummy} + \mathbf{b}_4 * \text{Trading Volume} + \mathbf{b}_5 * \text{Dividend Yield} \\ & + \mathbf{b}_6 * \text{Stock Return} + \mathbf{b}_7 * \text{Merger Dummy} \\ & + \sum_{i=93}^{98} \sum_{j=8}^{13} \mathbf{b}_j \text{ Year Dummy}_i + \mathbf{e} \end{aligned}$$

6. EMPIRICAL RESULTS

6.1 Univariate Analysis

Table 7 provides descriptive statistics for short selling groups constructed based on the level of short selling activities. Specifically, two groups are formed. Low level of relative short interest group includes firm quarters with relative short interest no greater than the mean of relative short interest of all firm-quarter observations. High level of relative short interest group consists of firm quarters with relative short interest greater than the mean of the relative short interest of all firm-quarter observations. Discretionary accruals for the low relative short interest group and high relative short interest group are -0.043 and -0.036 respectively. Mean discretionary accruals of these two groups are significantly different (t -statistic = -2.71). Similarly, low relative short interest group has significantly lower total accruals (t -statistic = -2.43). Consistent with the notion that short selling could be motivated by arbitrage and hedging purpose, the high level of relative short interest group has stocks that are more likely to have traded options, convertible debt or convertible preferred stock, and be an acquirer in a stock merger. Moreover, stocks with high levels of short interest have lower dividend yield, supporting the notion that stocks with lower costs attract short sellers. In addition, stocks with higher short selling activity tend to be large firm and firms that are heavily traded. Finally, stock returns and market returns are not significantly different between two groups.

Table 8 presents Pearson correlation coefficients and related p -values. Quarterly accruals are significantly and positively related to short selling activities

Table 7 Descriptive Statistics of Short Selling Groups

This table presents the descriptive statistics of short selling groups. The low level of relative short interest group includes firm quarters with relative short interest no greater than the mean of relative short interest of all firm-quarter observations. The high level of relative short interest group consists of firm quarters with relative short interest greater than the mean of the relative short interest of all firm-quarter observations.

Variables	Low Level of Relative Short Interest	High level of Relative Short Interest	Difference		
	Mean	Mean	Mean	t-statistic	p-value
Discretionary Accruals	-0.043	-0.036	-0.007	-2.71	0.0067
Total Accruals	-0.078	-0.072	-0.006	-2.43	0.0151
Ln(Volume)	10.777	11.860	-1.083	-27.30	<0.0001
Ln(Size)	7.421	7.571	-0.150	-5.24	<0.0001
Dividend Yield	0.0051	0.0036	0.0015	7.16	<0.0001
Stock Return	0.0077	0.0062	0.0015	0.62	0.5332
Market Return	0.0129	0.0130	-0.000035	-0.05	0.9641
Convertible Dummy	0.0855	0.2890	-0.2340	-24.75	<0.0001
Option Dummy	0.5027	0.6776	-0.201	-18.13	<0.0001
Merger Dummy	0.0034	0.0138	-0.010	-4.71	<0.0001
Number of observations	8,495	3,042			

Table 8 Pearson Correlation Coefficients

This table presents correlation coefficients for variables of interest for 11,537 firm quarter observations. The probability that each correlation is different from zero (p-value) is reported in the parentheses.

Variables	Relative Short Interest	Discretionary Accruals	Total Accruals	Convertible Dummy	Option Dummy	Ln(Volume)	Ln(Size)	Dividend Yield	Stock Return	Market Return	Merger Dummy
Relative Short Interest	1.0000	0.0366 (<0.0001)	0.0387 (<0.0001)	0.2619 (<0.0001)	0.1312 (<0.0001)	0.1940 (<0.0001)	0.0093 (0.3176)	-0.0338 (0.0003)	0.0130 (0.1638)	0.0066 (0.4802)	0.0586 (<0.0001)
Discretionary Accruals		1.0000	0.7146 (<0.0001)	0.0562 (<0.0001)	-0.0438 (<0.0001)	-0.0754 (<0.0001)	-0.0387 (<0.0001)	0.0106 (0.2566)	-0.0135 (0.1470)	-0.0528 (<0.0001)	0.0065 (0.4849)
Total Accruals			1.0000	0.0468 (<0.0001)	-0.0445 (<0.0001)	-0.0847 (<0.0001)	-0.0930 (<0.0001)	-0.0136 (0.1441)	-0.0164 (0.0788)	0.0049 (0.5974)	0.0250 (0.0073)
Convertible Dummy				1.0000	0.0960 (<0.0001)	0.0223 (0.0166)	0.0137 (0.1413)	-0.0160 (0.0865)	0.0167 (0.0728)	-0.0171 (0.0659)	0.0500 (<0.0001)
Option Dummy					1.0000	0.3356 (<0.0001)	0.4576 (<0.0001)	-0.0285 (0.0022)	0.0205 (0.0280)	-0.0076 (0.4139)	0.0227 (0.0147)
Ln(Volume)						1.0000	0.5715 (<0.0001)	-0.0314 (0.0007)	0.0058 (0.5330)	0.0678 (<0.0001)	0.0411 (<0.0001)
Ln(Size)							1.0000	0.0233 (0.0125)	-0.0118 (0.2043)	-0.0166 (0.0751)	0.01740 (0.0616)
Dividend Yield								1.0000	-0.0058 (0.5365)	-0.0092 (0.3229)	-0.0082 (0.3777)
Stock Return									1.0000	0.3538 (<0.0001)	0.0224 (0.0161)
Market Return										1.0000	0.0129 (0.1650)
Merger Dummy											1.0000

with coefficient of 0.039 and a p-value less than 0.0001. This provides supporting evidence that short sellers target stocks with higher accruals. In addition, I find a significantly positive correlation between quarterly discretionary accruals and relative short interest (coefficient=0.037 and p-value < 0.0001). The correlation coefficient is 0.037 and p-value is less than 0.0001. This is consistent with the prediction that short seller detect earnings management through discretionary accruals by selling short stocks with large income-increasing discretionary accruals.

Consistent with the conjecture that short selling may be motivated by arbitrage and hedging, the option dummy variable, convertible dummy variable, and the merger dummy variable are significantly and positively related to relative short interest. The option dummy variable is highly correlated with the relative short interest with a coefficient of 0.132 (p-value: <0.0001). This is consistent with prior research that the existence of a traded option on the underlying stock increases short selling activities (Figlewski and Webb 1993). The highly significant and positive correlation coefficient between the convertible dummy variable and relative short interest indicates that short selling may be motivated by hedging and arbitrage purpose. This is consistent with Brent, Morse and Stice (1990) in that short selling is an integral part of hedging and arbitrage strategy. The coefficient between the merger dummy variable and the short selling activity is significantly positive, suggesting that short sale is positively related to the risk arbitrage in the stock merger activities.

The quarterly dividend yield is significantly and negatively associated with the percentage of shares sold short with a correlation coefficient of -0.034 and p-value of 0.0003. Dividends increase the cost of short selling because short sellers are

obligated to reimburse the equity owner any dividend declared during the time period of a short sale. Additionally, short sellers essentially repay the borrowed stock at a higher price because of the ex-dividend day effect, that is, stock prices fail to adjust fully for the dividend. This is consistent with the notion that stocks with lower short selling costs attract short sellers.

Trading volume is significantly and positively correlated with relative short interest (coefficient of 0.194 and p -value < 0.0001). This suggests that stocks with high trading volume have a high level of short interest. There is no significant relation between firm size and short selling activity. I find that firm size and trading volume are highly significantly and positively correlated (0.57). Thus, I use trading volume and firm size alternatively in separate regression models.

6.2 Multivariate Analysis

6.2.1. Analysis of Full Sample of Firm-quarter Observations

The results of the multivariate analysis of the full sample of 11,537 firm-quarter observations are presented in Table 9. This regression includes pooled data for all fiscal quarters from 1992 to 1998. The first column reports regression results using quarterly discretionary accruals as the independent variable (Model 1). The second column presents the regression results using quarterly total accruals as the independent variable (Model 2). The results indicate that relative short interest is significantly and positively related to quarterly total accruals with a coefficient of 0.011 and t -statistic of 5.1. This implies that short sellers establish short positions in stocks with high accruals.

Table 9: Regression Results for the Association between Earnings Management and Short Interest (Quarterly Data)

This table reports regression results for the association between earnings management and short interest. Data include 11,537 firm-quarter observations of non-financial NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on the 8th of the given month of the years from 1992 to 1999). The independent variables include the quarterly discretionary accruals in four quarters estimated from cross-sectional modified Jones model adapted on a quarterly basis, quarterly total accruals, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in a given month and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, quarterly dividend yield, year dummy variables, the stock return, which is compounded from the 9th of the previous month to the 8th of the current month, and the CRSP value-weighted index return compounded from the 9th of the previous month to the 8th of the current month. T-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2
Intercept		-0.0125 (-9.02***)	-0.0123 (-8.86***)
Discretionary Accruals	+	0.0092 (4.48***)	
Total Accruals	+		0.0111 (5.10***)
Option Dummy	+	0.0024 (4.19***)	0.0024 (4.05***)
Convertible Dummy	+	0.0209 (28.30***)	0.0209 (28.26***)
Average Daily Trading Volume	+	0.0026 (14.03***)	0.0027 (14.32***)
Dividend Yield	-	-0.0376 (-2.20**)	-0.0359 (-2.10**)
Stock Return		0.0040 (1.47)	0.0043 (1.58)
Market Return		-0.0147 (-1.72*)	-0.0158 (-1.86**)
Merger Dummy	+	0.0128 (3.93***)	0.0125 (3.83***)

Table 9 –Continued

Dummy 93-98	Suppressed	Suppressed
No of Observations	11,537	11,537
Adjusted R-square	0.1175	0.1179
F Statistic	110.68***	111.15***

Discretionary accruals are also significantly and positively associated with short selling activity (coefficient: 0.009; t -statistic: 4.48). Short sellers appear able to see through income-increasing earnings management and go short in the stocks with high levels of discretionary accruals. An increase in discretionary accruals is associated with 0.9% increase in relative short interest. Consistent with prior research, stocks with traded options have higher levels of short interest, indicating options facilitate short selling activity. The coefficient of *Option Dummy* is positive and statistically significant at the 1% level. In model 1, this coefficient is 0.0024 with t -statistic of 4.19 and p -value of less than 0.0001. In model 2, the coefficient is 0.0024 with t -statistic of 4.05 and p -value of less than 0.0001. The option market makers increase the short positions in the underlying securities to hedge their positions. Because investors may use options as a substitute for going short when they have pessimistic beliefs, the positive coefficient indicates that options act as an instrument to achieve an arbitrage strategy and this arbitrage-motivated short selling dominates the alternative of short selling for speculative purposes. The coefficients of *Convertible Dummy* in model 1 and model 2 are 0.0209 in both models and are statistically significant at the 1% level, indicating that stocks with convertible securities have higher levels of relative short interest. This is consistent with the notion that arbitrageurs may establish short positions to offset the imbedded option on the underlying security.

The coefficients of *Merger Dummy* are 0.0128 and 0.0125 in model 1 and model 2 respectively. These significantly positive coefficients (p -value < 1%) of the merger dummy variable suggest that risk arbitrageurs engage in short selling activity

to lock in the arbitrage spread. Trading volume is significantly and positively associated with relative short interest. The coefficients of the trading volume are 0.0026 and 0.0027 for models 1 and 2 respectively. These two trading volume coefficients are both significant at the 1% level. This result indicates that heavily traded stocks have large short selling activity. This evidence is consistent with prior studies in that short sellers target stocks with lower transaction costs. In addition, the result shows that stocks with lower dividend yield are more likely to be sold short. Dividend yield is inversely related to short selling activity. The coefficient of dividend yield is -0.038 in model 1 and -0.036 in model 2. Both coefficients are statistically significant at the 5% level. This evidence is consistent with prior studies in that short sellers target stocks with lower costs of short selling. The result shows no significant relation between contemporary stock return and short selling activity. However, the contemporary market return is negatively related to the relative short interest at the 10% level.

6.2.2. Analysis of Sample of Firm-quarter Observations by Separate Quarters

I conduct further analysis of the relation between speculative short selling activity and accrual management by decomposing the quarterly data into four different quarters. The results are reported in Tables 10 through 13. Quarterly discretionary accruals are employed as the independent variable in Models 1 and 2 and quarterly total accruals are used as the independent variable in Models 3 and 4, respectively. Table 10 reports the regression results for the relationship between relative short interest in June and discretionary accruals (total accruals) in the first

Table 10 Regression Results for the Association between Earnings Management and Short Interest in June (Quarterly Data)

This table reports regression results for the association between earnings management and short interest in June for the years 1992 through 1998. Data includes 2,664 firm-quarter observations of non-financial NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on the June 8 for the years 1992 to 1998). The independent variables include discretionary accruals in the first quarter, which are estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, total accruals in the first quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, the natural logarithm of firm size (market value of the equity plus the total debt and preferred stock), dividend yield in the first quarter, year dummy variables, and the stock return, which is compounded from the May 9 to June 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2	Model 3	Model 4
Intercept		-0.0118 (-4.17***)	0.0076 (2.51***)	-0.0118 (-4.19***)	0.0076 (2.49***)
Discretionary Accruals	+	-0.0077 (-0.61)	-0.0059 (-0.46)		
Total Accruals	+			0.0095 (0.69)	0.0069 (0.50)
Option Dummy	+	0.0017 (1.48)	0.0064 (5.52***)	0.0017 (1.49)	0.0064 (5.52***)
Convertible Dummy	+	0.0200 (13.63***)	0.0208 (14.11***)	0.0200 (13.63***)	0.0208 (14.11***)
Average Daily Trading Volume	+	0.0027 (7.16***)		0.0027 (7.16***)	
Firm Size			-0.0006 (-1.73*)		-0.0006 (-1.72*)

Table 10-Continued

Dividend Yield	—	-0.3712 (-4.20***)	-0.3539 (-3.93***)	-0.3708 (-4.19***)	-0.3537 (-3.93***)
Stock Return		-0.0045 (-0.72)	-0.0041 (-0.63)	-0.0047 (-0.75)	-0.0043 (-0.68)
Merger Dummy	+	0.0138 (2.72***)	0.0135 (2.64***)	0.0137 (2.70***)	0.0134 (2.63***)
Dummy 93-98		Suppressed	Suppressed	Suppressed	Suppressed
No of Observations		2,664	2,664	2,664	2,664
Adjusted R-square		0.1274	0.1116	0.1275	0.1116
F Statistic		30.91***	26.72***	30.92***	26.73***

quarter. There is no significant association between short selling activity and either discretionary accruals or total accruals. Relative short interest is significantly and positively related to the *Option Dummy* in Models 2 and 4. The *Convertible Dummy* and *Merger Dummy* variables are positive and statistically significant at the 1% level in all four models, consistent with the notion that hedging and arbitrage can motivate short selling. The *Average Daily Trading Volume* is positively related to short selling activity in all four models. The coefficient on dividend yield is significantly negative in all four models.

Table 11 reports the regression results for the association between short interest in September (August 9 to September 8) and discretionary accruals (total accruals) in the second quarter. The results show that discretionary accruals are positively related to relative short interest. The coefficients of discretionary accruals in Models 1 and 2 are 0.0108 and 0.0102 respectively. These coefficients are statistically significant at the 10% level. In Model 3, total accruals are positively related to short selling activity with a coefficient of 0.0149, *t*-statistic of 2.34, and *p*-value of 0.019. In Model 4, total accruals are marginally significant with *p*-value of 0.1001. The *Option Dummy*, *Convertible Dummy*, and *Merger Dummy* variables are all systematically positively associated with relative short interest. The coefficient on *Trading Volume* is significantly positive whereas the coefficient on the *Firm Size* is significantly negative.

The results reported in Table 12 indicate that both discretionary accruals and total accruals in the third quarter are significantly and positively related to the percentage of the number of shares sold short in December (November 9 to

Table 11: Regression Results for the Association between Earnings Management and Short Interest in September (Quarterly Data)

This table reports regression results for the association between earnings management and short interest in September for the years 1992 through 1998. Data includes 2,656 firm-quarter observations of non-financial NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on September 8 for the years 1992 to 1998). The independent variables include discretionary accruals in the second quarter, which are estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, total accruals in the second quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, the natural logarithm of firm size (market value of the equity plus the total debt and preferred stock), dividend yield in the second quarter, year dummy variables, and the stock return, which is compounded from August 9 to September 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2	Model 3	Model 4
Intercept		-0.0094 (-3.30***)	0.0107 (3.48***)	-0.0094 (-3.30***)	0.0106 (3.47***)
Discretionary Accruals	+	0.0108 (1.87*)	0.0102 (1.75*)		
Total Accruals	+			0.0149 (2.34**)	0.0105 (1.64)
Option Dummy	+	0.0035 (2.97***)	0.0087 (7.37***)	0.0035 (2.94***)	0.0087 (7.34***)
Convertible Dummy	+	0.0198 (13.22***)	0.0203 (13.57***)	0.0198 (13.24***)	0.0204 (13.61***)
Average Daily Trading Volume	+	0.0022 (5.72***)		0.0023 (5.86***)	
Firm Size			-0.0013 (-3.37***)		-0.0012 (-3.25***)

Table 11-Continued

Dividend Yield	–	-0.1671 (-1.71*)	-0.0801 (-0.81)	-0.1541 (-1.57)	-0.0716 (-0.72)
Stock Return		0.0118 (1.92*)	0.0097 (1.57)	0.0121 (1.98**)	0.0098 (1.59)
Merger Dummy	+	0.0169 (2.38**)	0.0203 (2.84***)	0.0166 (2.33**)	0.0200 (2.81***)
Dummy 93-98		Suppressed	Suppressed	Suppressed	Suppressed
No of Observations		2,656	2,656	2,656	2,656
Adjusted R-square		0.1152	0.1080	0.1158	0.1079
F Statistic		27.58***	25.73***	27.75***	25.70***

Table 12: Regression Results for the Association between Earnings Management and Short Interest in December (Quarterly Data)

This table reports regression results for the association between earnings management and short interest in December for the years 1992 through 1998. Data includes 2,725 firm-quarter observations of non-financial NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on December 8 for the years 1992 to 1998). The independent variables include discretionary accruals in the third quarter, which are estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, total accruals in the third quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, the natural logarithm of firm size (market value of the equity plus the total debt and preferred stock), dividend yield in the third quarter, year dummy variables, and the stock return, which is compounded from November 9 to December 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2	Model 3	Model 4
Intercept		-0.0106 (-3.91***)	0.0090 (3.09***)	-0.0101 (-3.70***)	0.0093 (3.19***)
Discretionary Accruals	+	0.0110 (2.95***)	0.0100 (2.68***)		
Total Accruals	+			0.0143 (3.38***)	0.0110 (2.60***)
Option Dummy	+	0.0038 (3.33***)	0.0088 (7.67***)	0.0037 (3.25***)	0.0087 (7.57***)
Convertible Dummy	+	0.0224 (15.36***)	0.0232 (15.89***)	0.0223 (15.31***)	0.0232 (15.89***)
Average Daily Trading Volume	+	0.0022 (6.06***)		0.0023 (6.22***)	
Firm Size			-0.0011 (-2.96***)		-0.0010 (-2.76***)

Table 12-Continued

Dividend Yield	–	-0.0128 (-0.72)	-0.0124 (-0.69)	-0.0128 (-0.72)	-0.0125 (-0.70)
Stock Return		-0.0080 (-1.63)	-0.0076 (-1.55)	-0.0081 (-1.64)	-0.0078 (-1.59)
Merger Dummy	+	0.0086 (1.19)	0.0087 (1.20)	0.0082 (1.14)	0.0085 (1.17)
Dummy 93-98		Suppressed	Suppressed	Suppressed	Suppressed
No of Observations		2,725	2,725	2,725	2,725
Adjusted R-square		0.1369	0.1280	0.1378	0.1279
F Statistic		34.24***	31.77	34.48	31.73

December 8). Specifically, the coefficients on discretionary accruals in Models 1 and 2 are 0.011 and 0.010 respectively. Similarly, the coefficients on total accruals in Models 3 and 4 are 0.014 and 0.011 respectively. These coefficients are all statistically significant at the 1% level. This indicates that short sellers establish short position in stocks with high accruals and large discretionary accruals in the third quarter. The *Option Dummy* and *Convertible Dummy* variables are positively associated with relative short interest as predicted. Higher levels of *Trading Volume* are related to higher levels of short interest.

The findings reported in Table 13 indicate a positive relationship between discretionary accruals (total accruals) in the fourth quarter and short interest in April (March 9 to April 8) in the subsequent year. The coefficient of discretionary accruals is 0.0118 in Model 1 and 0.0109 in Model 2. The coefficient of total accruals is 0.0208 in Model 3 and 0.0165 in Model 4. These four coefficients are larger in magnitude and more significant than the four coefficients of discretionary accruals (total accruals) in table 12. The *Option Dummy* is significantly and positively related to relative short interest in Models 2 and 4. The *Convertible Dummy* is systematically positively associated with short selling activity through all four models. Heavily traded stocks have larger short positions.

In sum, the results from the analysis of firm-quarter observations suggest that short sellers establish their short positions in stocks with high quarterly total accruals (discretionary accruals). This provides strong evidence that short seller are sophisticated investors. They utilize interim financial accounting information on a timely basis and can detect earnings management via discretionary accruals and trade

Table 13: Regression Results for the Association between Earnings Management and Short Interest in April (Quarterly Data)

This table reports regression results for the association between earnings management and short interest in April for the years 1993 through 1999. Data includes 3,492 firm-quarter observations of non-financial NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on April 8 for the years 1993 to 1999). The independent variables include discretionary accruals in the fourth quarter, which are estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, total accruals in the fourth quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, the natural logarithm of firm size (market value of the equity plus the total debt and preferred stock), dividend yield in the fourth quarter, year dummy variables, and the stock return, which is compounded from the March 9 to April 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2	Model 3	Model 4
Intercept		-0.0132 (-4.75***)	0.0115 (3.90***)	-0.0118 (-4.26***)	0.0122 (4.12***)
Discretionary Accruals	+	0.0118 (3.47***)	0.0109 (3.16***)		
Total Accruals	+			0.0208 (5.29***)	0.0165 (4.14***)
Option Dummy	+	0.0011 (0.99)	0.0071 (6.13***)	0.0011 (0.99)	0.0070 (6.08***)
Convertible Dummy	+	0.0209 (14.34***)	0.0221 (15.16***)	0.0205 (14.09***)	0.0219 (15.02***)
Average Daily Trading Volume	+	0.0031 (8.40***)		0.0033 (8.79***)	
Firm Size			-0.0010 (-2.75***)		-0.0008 (-2.32***)

Table 13-Continued

Dividend Yield	–	-0.0790 (-1.39)	-0.0517 (-0.89)	-0.0584 (-1.03)	-0.0367 (-0.64)
Stock Return		0.0136 (2.73***)	0.0161 (3.21***)	0.0143 (2.88***)	0.0169 (3.38***)
Merger Dummy	+	0.0109 (1.50)	0.0142 (1.95*)	0.0102 (1.41)	0.0137 (1.87*)
Dummy 93-98		Suppressed	Suppressed	Suppressed	Suppressed
No of Observations		3,492	3,492	3,492	3,492
Adjusted R-square		0.1053	0.0891	0.1094	0.0910
F Statistic		32.61***	27.28***	33.98***	27.89***

on the information in total accruals and discretionary accruals. I argue that managers of a firm tend to manage earnings more as the fiscal year-end is drawing near because the overall earnings performance is revealed through the earnings per share by the end of the fiscal year. Managers are under great pressure to meet or beat the financial analyst forecast. Moreover, managers may employ other earnings smoothing mechanisms during the fiscal year. Specifically, they may engage in risk management by using financial derivatives to smooth earnings. Pincus and Rajgopal (2002) suggest that managers first make decisions on implementing risk management strategy by using financial derivatives and then, especially in the fourth fiscal quarter reduce the residuals of volatility of earnings by trading off discretionary accruals management and hedging using derivatives. The sequential process of choice between risk management and earnings management provide potential explanations for the strong systematic relationship between discretionary accruals and relative short interest in the third and fourth quarters.

6.2.3. Analysis of a Sample of Firm-year Observations

In addition to the analysis of quarterly data, I further investigate whether there is an association between the level of relative short interest and annual accruals (annual discretionary accruals). The relative short interest is measured as the short interest in April (March 9 to April 8) following the fiscal year-end divided by the number of shares outstanding on eighth of April after the fiscal year-end. The results are reported in Table 14. The coefficient on discretionary accruals is 0.0071 and statistically significant at the 5% level. The coefficient on total accruals is 0.0263 and significant at the 1% level. Consistent with the results using quarterly data, total

accruals and discretionary accruals are significantly and positively associated with the level of short interest, suggesting that short sellers see through earnings management by targeting stocks with high levels of total accruals and discretionary accruals based on the financial accounting information in the 10-K report. Additionally, the results indicate a positive relationship between relative short interest and the *Convertible Dummy*, *Trading Volume*, and *Stock Returns* variables. Also, the findings suggest that high dividend yield stocks have low levels of short selling activities.

**Table 14 Regression Results for the Association between Earnings Management and Short Interest in April
(Annual Data)**

This table reports regression results for the association between earnings management and short interest in April for the years 1993 through 1999. Data includes 5,118 firm-year observations of non-financial NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on the April 8 for the years 1993 to 1999). The independent variables include discretionary accruals in the fourth quarter, which are estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, total accruals in the fourth quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, dividend yield in the fourth quarter, year dummy variables, the stock return, which is compounded from the March 9 to April 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2
Intercept		-0.0125 (-4.69***)	-0.0118 (-4.42***)
Discretionary Accruals	+	0.0071 (1.98**)	
Total Accruals	+		0.0263 (4.85***)
Option Dummy	+	-0.0009 (-0.81)	-0.0009 (-0.83)
Convertible Dummy	+	0.0175 (12.01***)	0.0175 (12.05***)
Average Daily Trading Volume	+	0.0035 (9.96***)	0.0037 (10.24***)
Dividend Yield	-	-0.0451 (-3.13***)	-0.0450 (-3.13***)
Stock Return		0.0128 (2.78***)	0.0143 (3.06***)
Merger Dummy	+	0.0111 (1.35)	0.0106 (1.29)
Dummy 93-98		Suppressed	Suppressed

Table 14-Continued

No of Observations	5,118	5,118
Adjusted R-square	0.0656	0.0691
F Statistic	28.62***	30.23***

7. SENSITIVITY ANALYSIS

Healy and Wahlen (1999) demonstrate that earnings management could be motivated by regulation. In the United States, financial service industries such as banking, insurance and utilities are heavily regulated. The regulators monitor these industries closely using accounting information. In past, rates have been regulated closely in the utilities industry. Prior research in earnings management provides evidence of earnings management in insurance, banking and utilities industries (e.g. Paek 2001). However, there are few studies that provide information as to whether investors and regulators of utilities detect earnings management. Among my sample firms, 11.69% are electric, gas and sanitary services with a two-digit SIC code of 49. In the following analysis, I restrict my sample to non-regulated firms. Tables 15 to 20 report the regression results of all models. The results for both quarterly data and annual data are qualitatively similar to results reported in Tables 9 through 14. Both discretionary accruals and total accruals are significantly and positively related to the relative short interest for samples of firm-quarter and firm-year observations respectively.

Table 15 Regression Results for the Association between Earnings Management and Short Interest Excluding Utilities (Quarterly Data)

This table reports regression results for the association between earnings management and short interest. Data includes 11,197 firm-quarter observations of non-financial, non-regulated NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on the 8th of the given month of the years 1992 to 1999). The independent variables include quarterly discretionary accruals in four quarters estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, quarterly total accruals, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in a given month and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, quarterly dividend yield, year dummy variables, the stock return, which is compounded from the 9th of the previous month to the 8th of the current month, and the CRSP value-weighted index return compounded from the 9th of the previous month to the 8th of the current month. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2
Intercept		-0.0124 (-8.69***)	-0.0122 (-8.55***)
Discretionary Accruals	+	0.0101 (4.81***)	
Total Accruals	+		0.0115 (5.24***)
Option Dummy	+	0.0020 (3.36***)	0.0019 (3.22***)
Convertible Dummy	+	0.0223 (29.09***)	0.0223 (29.07***)
Average Daily Trading Volume	+	0.0026 (13.70***)	0.0027 (14.00***)
Dividend Yield	-	-0.0327 (-1.89*)	-0.0312 (-1.80*)
Stock Return		0.0044 (1.60)	0.0047 (1.71*)
Market Return		-0.0148 (-1.70*)	-0.0160 (-1.84**)
Merger Dummy	+	0.0131 (3.94***)	0.0128 (3.84***)

Table 15-Continued

Dummy 93-98	Suppressed	Suppressed
No of Observations	11,197	11,197
Adjusted R-square	0.1204	0.1208
F Statistic	110.50***	110.85***

Table 16: Regression Results for the Association between Earnings Management and Short Interest in June Excluding Utilities (Quarterly Data)

This table reports regression results for the association between earnings management and short interest in June for the years 1992 through 1998. Data includes 2,586 firm-quarter observations of non-financial, non-regulated NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on June 8th for the years 1992 to 1998). The independent variables include discretionary accruals in the first quarter, which are estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, total accruals in the first quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, the natural logarithm of firm size (market value of the equity plus the total debt and preferred stock), dividend yield in the first quarter, year dummy variables, and the stock return, which is compounded from the May 9 to June 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2	Model 3	Model 4
Intercept		-0.0121 (-4.20***)	0.0077 (2.50***)	-0.0122 (-4.22***)	0.0077 (2.49***)
Discretionary Accruals	+	-0.0072 (-0.56)	-0.0052 (-0.40)		
Total Accruals	+			0.0094 (0.67)	0.0064 (0.45)
Option Dummy	+	0.0013 (1.08)	0.0062 (5.16***)	0.0013 (1.09)	0.0062 (5.17***)
Convertible Dummy	+	0.0214 (14.08***)	0.0222 (14.48***)	0.0214 (14.09***)	0.0222 (14.48***)
Average Daily Trading Volume	+	0.0027 (7.10***)		0.0027 (7.10***)	
Firm Size			-0.0007 (-1.82*)		-0.0007 (-1.81*)

Table 16-Continued

Dividend Yield	–	-0.3524 (-3.82***)	-0.3168 (-3.37***)	-0.3530 (-3.82***)	-0.3173 (-3.38***)
Stock Return		-0.0031 (-0.49)	-0.0028 (-0.44)	-0.0034 (-0.53)	-0.0030 (-0.47)
Merger Dummy	+	0.0148 (2.85***)	0.0145 (2.76***)	0.0147 (2.82***)	0.0144 (2.74***)
Dummy 93-98		Suppressed	Suppressed	Suppressed	Suppressed
No of Observations		2,586	2,586	2,586	2,586
Adjusted R-square		0.1302	0.1143	0.1302	0.1143
F Statistic		30.76***	26.66***	30.78***	26.67***

Table 17: Regression Results for the Association between Earnings Management and Short Interest in September Excluding Utilities (Quarterly Data)

This table reports regression results for the association between earnings management and short interest in September for the years 1992 through 1998. Data includes 2,576 firm-quarter observations of non-financial, non-regulated NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on September 8 for the years 1992 to 1998). The independent variables include discretionary accruals in the second quarter, which are estimated from cross-sectional modified Jones model adapted on a quarterly basis, total accruals in the second quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, the natural logarithm of firm size (market value of the equity plus the total debt and preferred stock), dividend yield in the second quarter, year dummy variables, and the stock return, which is compounded from the August 9 to September 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2	Model 3	Model 4
Intercept		-0.0094 (-3.24***)	0.0110 (3.51***)	-0.0094 (-3.24***)	0.0109 (3.49***)
Discretionary Accruals	+	0.0118 (2.01**)	0.0115 (1.95*)		
Total Accruals	+			0.0150 (2.32**)	0.0107 (1.65*)
Option Dummy	+	0.0032 (2.65***)	0.0086 (7.03***)	0.0032 (2.62***)	0.0085 (7.00***)
Convertible Dummy	+	0.0211 (13.58***)	0.0215 (13.83***)	0.0212 (13.60***)	0.0216 (13.87***)
Average Daily Trading Volume	+	0.0022 (5.53***)		0.0022 (5.67***)	
Firm Size			-0.0013 (-3.50***)		-0.0013 (-3.38***)

Table 17-Continued

Dividend Yield	–	-0.1262 (-1.22)	-0.0135 (-0.13)	-0.1157 (-1.12)	-0.0069 (-0.07)
Stock Return		0.0115 (1.83*)	0.0096 (1.52)	0.0118 (1.87*)	0.0096 (1.52)
Merger Dummy	+	0.0179 (2.41**)	0.0212 (2.84***)	0.0176 (2.37**)	0.0209 (2.80***)
Dummy 93-98		Suppressed	Suppressed	Suppressed	Suppressed
No of Observations		2,576	2,576	2,576	2,576
Adjusted R-square		0.1172	0.1110	0.1177	0.1106
F Statistic		27.31***	25.72***	27.43***	25.63***

Table 18 Regression Results for the Association between Earnings Management and Short Interest in December Excluding Utilities (Quarterly Data)

This table reports regression results for the association between earnings management and short interest in December for the years 1992 through 1998. Data includes 2,643 firm-quarter observations of non-financial, non-regulated NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on December 8 for the years 1992 to 1998). The independent variables include the discretionary accruals in the third quarter, which are estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, total accruals in the third quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, the natural logarithm of firm size (market value of the equity plus the total debt and preferred stock), dividend yield in the third quarter, year dummy variables, and the stock return, which is compounded from the November 9 to December 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2	Model 3	Model 4
Intercept		-0.0104 (-3.71***)	0.0095 (3.18***)	-0.0098 (-3.49***)	0.0098 (3.28***)
Discretionary Accruals	+	0.0118 (3.11***)	0.0111 (2.89***)		
Total Accruals	+			0.0149 (3.48***)	0.0119 (2.75***)
Option Dummy	+	0.0035 (2.96***)	0.0085 (7.22***)	0.0034 (2.87***)	0.0084 (7.10***)
Convertible Dummy	+	0.0239 (15.75***)	0.0245 (16.15***)	0.0238 (15.71***)	0.0245 (16.16***)
Average Daily Trading Volume	+	0.0022 (5.83***)		0.0023 (6.00***)	
Firm Size			-0.0011 (-3.02***)		-0.0010 (-2.82***)

Table 18-Continued

Dividend Yield	–	-0.0114 (-0.63)	-0.0106 (-0.58)	-0.0116 (-0.64)	-0.0107 (-0.59)
Stock Return		-0.0069 (-1.38)	-0.0064 (-1.26)	-0.0071 (-1.41)	-0.0067 (-1.32)
Merger Dummy	+	0.0083 (1.14)	0.0083 (1.14)	0.0079 (1.09)	0.0081 (1.11)
Dummy 93-98		Suppressed	Suppressed	Suppressed	Suppressed
No of Observations		2,643	2,643	2,643	2,643
Adjusted R-square		0.1399	0.1318	0.1407	0.1315
F Statistic		34.05***	31.84	34.26	31.77

Table 19: Regression Results for the Association between Earnings Management and Short Interest in April Excluding Utilities (Quarterly Data)

This table reports regression results for the association between earnings management and short interest in April for the years 1993 through 1999. Data includes 3,392 firm-quarter observations of non-financial, non-regulated NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on April 8 for the years 1993 to 1999). The independent variables include discretionary accruals in the fourth quarter, which are estimated from cross-sectional modified Jones model adapted on a quarterly basis, total accruals in the fourth quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, the natural logarithm of firm size (market value of the equity plus the total debt and preferred stock), dividend yield in the fourth quarter, year dummy variables, and the stock return, which is compounded from the March 9 to April 8. *t*-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2	Model 3	Model 4
Intercept		-0.0131 (-4.61***)	0.0119 (3.93***)	-0.0118 (-4.13***)	0.0126 (4.15***)
Discretionary Accruals	+	0.0131 (3.77***)	0.0124 (3.53***)		
Total Accruals	+			0.0218 (5.46***)	0.0176 (4.36***)
Option Dummy	+	0.0006 (0.54)	0.0068 (5.67***)	0.0006 (0.52)	0.0067 (5.60***)
Convertible Dummy	+	0.0221 (14.70***)	0.0233 (15.42***)	0.0217 (14.46***)	0.0231 (15.30***)
Average Daily Trading Volume	+	0.0032 (8.26***)		0.0033 (8.67***)	
Firm Size			-0.0010 (-2.76***)		-0.0009 (-2.31**)

Table 19-Continued

Dividend Yield	–	-0.0686 (-1.18)	-0.0335 (-0.57)	-0.0479 (-0.83)	-0.0183 (-0.31)
Stock Return		0.0138 (2.71***)	0.0161 (3.15***)	0.0146 (2.90***)	0.0171 (3.35***)
Merger Dummy	+	0.0102 (1.40)	0.0137 (1.85*)	0.0095 (1.30)	0.0131 (1.77*)
Dummy 93-98		Suppressed	Suppressed	Suppressed	Suppressed
No of Observations		3,392	3,392	3,392	3,392
Adjusted R-square		0.1082	0.0922	0.1123	0.0940
F Statistic		32.65***	27.50***	33.99***	28.05***

**Table 20 Regression Results for the Association between Earnings Management and Short Interest in April Excluding Utilities
(Annual Data)**

This table reports regression results for the determinants of short interest in April for the years 1993 through 1999. Data includes 4,383 firm-year observations of non-financial NYSE stocks. The dependent variable is relative short interest (short interest divided by the number of shares outstanding on April 8 of the years 1993 to 1999). The independent variables include discretionary accruals in the fourth quarter, which are estimated from the cross-sectional Modified Jones model adapted on a quarterly basis, total accruals in the fourth quarter, an option dummy variable, which is set to 1 if the stock has a traded option and zero otherwise, a convertible dummy variable indicating if the stock has convertible debt or convertible preferred stock, a merger dummy variable, which indicates that a stock merger is announced in the same month as short interest and the firm is an acquirer, the natural logarithm of one plus the average daily trading volume, dividend yield in the fourth quarter, year dummy variables, the stock return, which is compounded from the March 9 to April 8. T-statistics are reported in the parentheses. ***, **, * denotes significance at the 1%, 5%, and 10% levels respectively.

Variables	Predicted Sign	Model 1	Model 2
Intercept		-0.0133 (-4.35***)	-0.0125 (-4.11***)
Discretionary Accruals	+	0.0068 (1.79**)	
Total Accruals	+		0.0277 (4.75***)
Option Dummy	+	-0.0011 (-0.82)	-0.0011 (-0.88)
Convertible Dummy	+	0.0201 (12.31***)	0.0201 (12.36***)
Average Daily Trading Volume	+	0.0036 (8.95***)	0.0037 (9.24***)
Dividend Yield		-0.0526 (-3.14***)	-0.0515 (-3.08***)
Stock Return		0.0125 (2.49***)	0.0139 (2.76***)
Merger Dummy	+	0.0088 (0.99)	0.0082 (0.92)
Dummy 93-98		Suppressed	Suppressed

Table 20-Continued

No of Observations	4,383	4,383
Adjusted R-square	0.0692	0.0733
F Statistic	26.07***	27.67***

8. CONCLUSIONS

This paper provides empirical evidence that sophisticated speculative short sellers exploit the market mispricing of quarterly total accruals and discretionary accruals. The results suggest that speculative short sellers target stocks with high accruals that are overvalued by the capital market. More importantly, speculative short sellers are sophisticated enough to distinguish the discretionary component of accruals from the non-discretionary component of accruals. They establish short positions in stocks with high income-increasing discretionary accruals based on the quarterly financial accounting report and the 10-K report. Prior research documents that earnings management causes stock mispricing in the capital market and thus the invested capital is not allocated efficiently. Recent studies suggest that auditors and financial analysts do not see through earnings management. This study contributes to the existing literature on earnings management by investigating whether speculative short sellers can detect earnings management. The results suggest that short sellers can detect earnings management by trading on the information in accruals and discretionary accruals disclosed in financial reporting.

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