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Do accruals exacerbate information asymmetry in the market?

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DO ACCRUALS EXACERBATE INFORMATION ASYMMETRY IN THE MARKET?

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ABSTRACT

A considerable body of evidence, both archival and experimental, suggests that accounting accruals are heterogeneously interpreted by investors. In this study, I examine whether the information asymmetry among investors arising from this heterogeneous interpretation, implied in these empirical results, affects transactions costs in the form of the bid-ask spread and its adverse selection component. I examine this impact both, in general, for all trading activity occurring for a firm over a continuous flow of information during the year and around the first release of accrual information for each quarter. The results of the study provide empirical evidence of a positive association between the adverse selection component of the bid-ask spread and accruals in the yearly analysis. The results of the quarterly event tests conducted both around earnings announcements and the 10-Q/K filing dates indicate that the increase in the adverse selection component of the spread is positively linked to the absolute magnitude of total accruals. Documenting the existence of such a real cost of accruals provides a transactions cost basis for understanding why cost of capital increases with accrual activity (Dechow et al. 1996, Francis et al. 2005) as well as suggesting that the information asymmetries associated with such activity merit serious attention of accounting policy makers.

1. INTRODUCTION

In this study, I investigate whether accounting accruals are linked with higher transaction costs in the form of bid-ask spread and its adverse selection component. My enquiry stems from considerable empirical evidence that suggests that accruals are heterogeneously interpreted across investors. Recent studies on the accrual anomaly first documented by Sloan (1996) have given conflicting results on whether different groups of investors can comprehend the pricing implications of accruals. While the presence of the accrual anomaly indicates that investors, on average, do not fully comprehend the lack of persistence of accruals, empirical evidence on exploitation of the anomaly by certain sets of informed investors such as, legally-defined insiders (Beneish and Vargus 2002), institutional investors (Lev and Nissim 2004), and short-sellers (Zhang and Cready 2003) suggests heterogeneous interpretation of accruals across investors resulting in exacerbated information asymmetry in the market. Since market microstructure literature (O'Hara 1995) states that higher information asymmetry leads to high transactions costs, I investigate whether high magnitudes of accruals are associated with higher transaction costs as evidenced in the bid-ask spread and its adverse selection component.

The accrual anomaly documented by Sloan (1996) has spawned considerable research among academicians. Specifically, Sloan (1996) demonstrates that the market, failing to anticipate the lack of persistence of accruals, tends to over-value (under-value) stocks with high (low) accruals, thereby, causing the accruals to be mispriced in the current period. This mispricing corrects itself in the subsequent periods so that the future period stock returns are negatively related to current period accruals. Consequently, he demonstrates that a hedge portfolio formed by taking a long (short) position in stocks with

low (high) accruals yields significant positive abnormal returns for a period of up to three years.

Extant literature on the accrual anomaly has investigated the anomaly from two perspectives – first, the nature of the anomaly and the firm-specific factors to which the anomaly may be attributable, and second, the capital market consequences of accruals. While the literature on the capital market consequences of the anomaly mainly focuses on the pricing implications of accruals and investigates whether different sets of investors comprehend the accrual information, the impact of accruals on the information environment and consequently, on the transaction costs incurred by investors while dealing in securities, has generally remained a neglected area of research. This study investigates whether the heterogeneous interpretation of accruals documented in prior research manifests itself in exacerbated information asymmetry in the market as evidenced in wider bid-ask spread and its adverse selection component.

The research on the nature of the anomaly documents several firm-specific factors that may be responsible for the mispricing of accruals. Xie (2001) finds that much of the accrual mispricing is attributable to abnormal accruals. Collins and Hribar (2000) demonstrate that the anomaly holds not just for the annual data but also for the quarterly data. Furthermore, they find that it is different from the post earnings announcement drift documented in prior literature (Bernard and Thomas 1989). Desai et al. (2002) suggest that the accrual anomaly may be a manifestation of the glamour anomaly depicted by Lakonishok (1994). While Fairfield et al. (2003) indicate that the accrual anomaly may not be distinct from the well documented growth anomaly characterized by the negative relation between return on assets and the growth in long-term operating assets, Richardson

et al. (2003) contend that it is the growth anomaly that may be an extension of the accrual anomaly, since the long-term operating assets used to measure the growth anomaly can also be categorized as accounting accruals. Chan et al. (2001) document that much of the accrual mispricing can be explained by the changes in inventories and the discretionary component of accruals. Zach et al. (2003) find that though a significant portion of the accrual mispricing may be ascribed to corporate events, book-to-market ratios and the stock exchange listings of the firms, much of the anomaly still remains unexplained.

The research on the capital market consequences of accruals has provided conflicting evidence on whether different categories of market participants comprehend the valuation implications of accruals. DeFond and Park (2001) find that the market only partially comprehends the accounting information contained in accruals. Bradshaw et al. (2001) demonstrate that neither the auditors nor the analysts signal to the investors the future declining performance of firms reflected in the current period accruals. Richardson (2003) finds no conclusive evidence on whether the short-sellers manage their trading activity based on the knowledge of the mispricing of accruals. However, Zhang and Cready (2003) depict that the speculative short-sellers take short positions for firms with large income-increasing accruals and profit from their mispricing. Beneish and Vargus (2002) provide evidence suggesting that insiders use their superior knowledge of extreme accruals to exploit the accrual anomaly profitably.

Studies on the analysts behavior vis-à-vis accruals generally suggests that the analysts fail to account for the economic information contained in high levels of accruals in their forecasts. Ali et al. (2001) find that accrual misrpicing is more pronounced for firms that have a high analyst following and a large percentage of institutional holdings. Teoh

and Wong (2002) show that the analyst failure to account for the decreasing future earnings implied in the current period accruals contributes to the mispricing of stocks by investors. Abarbanell and Lehavy (2003) demonstrate that the analyst failure to comprehend the accounting information contained in extreme accruals partially explains the bias and the inefficiency in their forecasts. Barth and Hutton (2004) also find that the analysts fail to comprehend or convey the lack of persistence of accruals in their forecasts.

Empirical evidence on institutional investor behavior suggests that institutional investors do comprehend and react to the knowledge of future declining performance contained in accruals. Balsam et al. (2002) show that the presence of institutional ownership leads to quicker comprehension of accruals in the market. Collins et al. (2003) find that the institutional investors comprehend and trade on their superior knowledge of accruals and help mitigate some of the accrual mispricing. Lev and Nissim (2004) document that not only do the institutional investors trade in a timely manner to the mispricing of accruals, their magnitude of accrual-related trading also is increasing with time.

While the presence of accrual mispricing indicates that investors, on average, do not fully comprehend the lack of persistence of accruals, empirical evidence on exploitation of accrual mispricing by certain sets of informed investors such as, legally-defined insiders (Beneish and Vargus 2002), institutional investors (Collins et al. 2003, Lev and Nissim 2004), and short-sellers (Zhang and Cready 2003) suggests heterogeneous interpretation of accruals across investors resulting in exacerbated information asymmetry in the market. To the extent these better-informed investors are trading on the basis of superior insights on accruals that are not shared by other investors, their profit-making

imposes trading losses on specialists and other suppliers of liquidity. Market microstructure literature (O'Hara 1995) suggests that the specialists, being relatively uninformed, tend to price-protect themselves by widening the spread in response to the losses suffered in dealing with these better-informed investors. In summary, if empirical evidence suggests that the accrual anomaly represents a form of mispricing that is profitably exploited by a subset of sophisticated traders, such exploitation should manifest in the form of wider bid-ask spreads and their adverse selection component.

I study whether accruals exacerbate information asymmetry by examining whether accruals are positively linked to the bid-ask spread and its adverse selection component. Market microstructure directly links the adverse selection component to the perceived level of information asymmetry in the market. Furthermore, I examine the association between accruals and spreads both in a long-term, non-event setting and around the point in time when the quarterly accrual information is first released to the investors. While the long-term association study examines whether firms with high magnitudes of accruals are associated with wider spreads, the quarterly event study investigates whether the increase in spreads around the first release of accrual information is positively related to the magnitude of accruals. Since it is not clear when the information is first released, I structure the event study tests both around earnings announcement and the filing of 10-K/10-Q report.

Using a sample of 5,377 firm-year observations for the sample period 1994-2001, I find empirical evidence suggesting that the adverse selection component of the spread is increasing in the absolute magnitude of total and abnormal accruals. The total spread also is also found to be positively related to abnormal accruals after controlling for the

endogeneity between accruals and spreads (Richardson 2000). The results of the event study are quite consistent with those of the yearly study. Empirical evidence in the quarterly event study indicates that the increase in the adverse selection component of the spread both around earnings announcements and the 10-Q/K filling dates is significantly positively related to the absolute magnitude of total accruals. The association between the abnormal adverse selection component and abnormal accruals is positive but insignificant in the event study.

However, contrary to the main hypothesis of the study, I find a negative association between total accruals and the total spread both in the yearly analysis and the quarterly event study. One interpretation of these results is that the other two components of the spread, namely, the order processing cost and the inventory holding cost, move in a direction opposite to the adverse selection component and subdue the information asymmetry effect of accruals on the total spread. Krinsky and Lee (1996) document that while the adverse selection component of the spread is found to increase during earnings announcement, the other two components of the spread, namely, the order processing cost and the inventory holding cost, decline during the same period. They conclude that the total bid-ask spread may not be an accurate measure of information asymmetry in the market.

An alternative explanation to the negative association between accruals and the bid-ask spread may lie in the overall decline in the total spreads resulting from the reduction in tick size introduced in 1997. Goldstein and Kavajecz (2000) document that spreads have declined by a total of 14.3% after the NYSE passed a rule to bring down the minimum variation in the spreads from $1/8^{th}$ to $1/16^{th}$ of a dollar per share. If total spreads decline and

adverse selection costs remain constant then adverse selection costs as a percentage of total spread would increase and thus the correlation between total spread and its adverse selection component is likely to be negative. It is plausible that an increase in the magnitude of accruals stimulates an increase in the adverse selection component of the spread. But the negative correlation between the total spread and its adverse selection component dominates or overshadows the positive impact of accruals on the adverse selection component, i.e., accruals and the adverse selection component may be positively linked to each other but both these variables may be negatively related to the total spread.

This study contributes to the existing literature on capital market response to accruals by demonstrating that high magnitudes of accruals exacerbate information asymmetry as evidenced in higher adverse selection component of the spread. Documenting the existence of such a real cost of accruals provides a transactions cost basis for understanding why cost of capital increases with abnormal accrual activity (Dechow et al. 1996, Bhattacharya 2002, Francis et al. 2005). Francis et al. (2005) interpret this association as arising from non-diversifiable information risk (Easley et al. 2002) but they acknowledge that the association could arise from non-information sources of priced risk. The empirical evidence of a positive association between accruals and the adverse selection component of the spread suggests that some measure of the positive linkage between accruals and cost of capital may be attributable to the informational inequalities resulting from heterogeneous interpretation of accruals.

Furthermore, the information asymmetries associated with the accrual activity merit serious attention of accounting policy makers. According to Lev (1998, p.1), "information asymmetries across investors lead to adverse private and social

consequences: higher transaction costs, thin markets, lower liquidity of securities, and in general decreased gains form trade. Such adverse consequences of inequity can be mitigated by a public policy mandating the disclosure of financial information in order to reduce information asymmetries."

The remaining sections of the paper are organized as follows: Section 2 describes the prior literature on accruals and the spreads. Section 3 explains the development of the hypotheses. Section 4 discusses the sample selection and the descriptive statistics of the data. The research methodology adopted to test the hypotheses is described in Section 5. Section 6 documents the empirical results and Section 7 concludes the paper.

2. PRIOR LITERATURE

2.1 Accrual Mispricing

Sloan (1996) finds that the accrual component of earnings tends to be less persistence than the cash flow component of earnings. His findings suggest that investors tend to "fixate" on total earnings, thereby failing to distinguish between the persistence of the cash and the accrual component of earnings. He demonstrates that the accrual mispricing that results from the "fixation hypothesis" corrects itself in future periods. This phenomenon results in the future abnormal stock price returns being negatively related to the current period accruals. His results suggest that investors, on average, are slow in comprehending the economic information contained in accruals.

2.2 Prior Literature on Accrual Mispricing

This phenomenon of mispricing of accruals, commonly known as the accrual anomaly, has been extensively researched in recent years. The extant research on the accrual anomaly may be viewed from two perspectives - first, that analyzes the plausible factors that contribute to accrual mispricing, and second, that investigates whether different market participants comprehend the underlying economic information contained in accruals. A discussion of these two sets of literature follows.

2.2.1 Factors Contributing to Accrual Mispricing

Xie (2001) further investigates the accrual anomaly and finds that much of the accrual mispricing documented by Sloan (1996) is attributable to abnormal accruals. The results of the Mishkin (1993) test conducted by him reveal that the valuation coefficient of accruals is significantly larger than the forecasting coefficient of accruals, suggesting that the market overprices accruals. He further demonstrates that this overpricing is more

pronounced for the abnormal accruals than the normal accruals. Consistent with Sloan (1996), he also conducts a hedge-portfolio test wherein he divides the entire portfolio into ten deciles based on the rankings of accruals. He, too, finds that going long (short) in the firms in the lowest (highest) decile of accruals yields positive future abnormal returns. The findings of the hedge-portfolio test confirm the over-valuation of abnormal accruals but not the normal accruals. The results of the two tests collectively indicate that much of the accrual msipricing found by Sloan (1996) relates to abnormal accruals.

Collins and Hribar (2000) examine whether the accrual anomaly documented by Sloan (1996) holds for quarterly data and whether this anomaly is distinct from the post-earnings announcement drift documented in accounting literature (Foster et al. 1984, Bernard and Thomas 1989). The literature on post-earnings announcement drift demonstrates that the stock price returns for at least 120 days after the earnings announcement tend to be positively related to the surprise in earnings, i.e., the standardized unexpected earnings (SUE) and that much of the price correction takes place around the two subsequent earnings announcements. The post-earnings announcement drift literature suggests that the market is slow in comprehending the information on future earnings contained in the current earnings surprises and hence, under-reacts to the surprise in earnings. Collins and Hribar (2000) form portfolios along rankings of both accruals and earnings surprises and find evidence of statistically significant abnormal returns associated with both accruals strategy and the unexpected earnings strategy. Specifically, they find that an investment strategy that takes a long (short) position in firms with extreme negative (positive) quarterly accruals *and* extreme positive (negative) quarterly earnings surprises yields significantly larger abnormal returns than those associated with each individual

strategy. Their findings reveal that not only does the accrual anomaly hold for the quarterly data, but also it is a phenomenon that is distinct from the post-earnings announcement drift.

Chan et al. (2001) decompose the total accruals into its various components and find that accounts receivables and inventory have the predicted negative relation with future period returns. They also separate the normal (non-discretionary) component from the (abnormal) discretionary component and find that it is the abnormal component that mainly predicts the future returns.

Desai et al. (2002) examine whether the accrual anomaly is distinct from the glamour anomaly depicted in the finance literature (Lakonishok et al. (1994).[1] They find that while accruals suppress the relation between future returns and sales growth, the relation between earnings price ratio and future returns remains robust even after controlling for accruals. Most importantly, they find that cash flow to price ratio subsumes the relation between accruals and future returns. They conclude that, given that the cash flow to price ratio is the most robust variable in the glamour anomaly, accrual anomaly appears to be a manifestation of the glamour anomaly.

Fairfield et al. (2003) investigate the extent to which the accrual mispricing is explained by the role of accruals as a component of growth in net operating assets. They argue that growth in net operating assets can be disintegrated into accruals and growth in long-term net operating assets. They find that after controlling for current profitability, both accruals and growth in long-term operating assets have a negative association with the return on assets in the subsequent year. They also demonstrate that the market seems to

[1] According to the glamour anomaly, 'value' ('glamour') stocks, characterized by high (low) book to market, earnings price ratio, cash flow to price ratio, and low (high) rate of growth in the past, are relatively under-priced (over-priced) and therefore, earn higher (lower) returns in future.

equally over-value both the components of growth in net operating assets in the current year. They conclude that the accrual anomaly depicted in prior literature may be a manifestation of the negative relation between the growth in net operating assets and ROA for the subsequent period.

Zach (2003) finds that the extreme accrual firms are more likely to have undergone corporate events.[2] He also finds that the returns from the accrual anomaly are reduced by 25% after he excludes firms that have undergone mergers and divestitures in the past. Additionally, he shows that when book to market is added as another variable along with size to measure normal returns, the returns to the accrual anomaly get reduced by another 20% approximately. Finally, he finds that the NASDAQ firms experience a higher return from the anomaly than the NYSE firms. He concludes that though a significant portion of the anomaly can be attributed to other factors, a large portion of it still remains unexplained.

Richardson et al. (2004) use a comprehensive balance sheet approach to segregate accruals on the basis of their degree of reliability. They demonstrate that accruals that are categorized as less reliable tend to be less persistent as compared to those classified as more reliable. They reinterpret the results of Farfield et al. (2003) by arguing that long-term operating assets are also accounting accruals and that their level of persistence is related to their degree of reliability. They contend that the results of Farfield et al. (2003) should be viewed as a more generalized extension of Sloan's (1996) accrual anomaly rather than being viewed as manifestation of a growth anomaly.

[2] Zach (2003) defines corporate events to include mergers and acquisitions, initial public offerings, seasoned equity offerings, restructurings, and divestitures.

Pincus et al. (2005) investigate whether the accrual anomaly is a globally relevant phenomenon. They find that the accrual anomaly is more prevalent in countries that have a legal tradition of common law as opposed to code law, greater freedom to use accruals, lower concentration of stock ownership, and weaker laws for the protection of shareholders' rights.

2.2.2 Investor Credulity and Accrual Mispricing

The research on the capital market consequences of accrual mispricing has produced mixed results on whether the different sets of investors comprehend the economic consequences underlying accruals. Teoh and Wong (2001) explore whether analysts understand the future earnings implications contained in the current period accruals in two settings – first, during an equity issue, and second, in general, for firms that have high abnormal accruals. They find that the current period accruals are significantly positively related to future optimistic analyst forecast errors for up to four years after an equity issue. Similarly, in a general non-issue setting, they find the current period abnormal accruals significantly explain the future optimistic forecast errors. Furthermore, they find that the portion of future optimistic forecast errors that is predictable by the current period accruals is also significantly positively related to the future declining stock returns. The results of their study indicate that the analyst failure to account for the declining future performance implied in the current period accruals largely explains the over-valuation of stock prices in the current period and its subsequent reversal in the future periods.

Ali et al. (2000) investigate whether the negative association between accruals and future stock returns is decreasing in the level of investor sophistication. They

argue that if the accrual anomaly is attributable to the naivety of investors, it should decline with the increase in the level of endowed investors. Contrary to their expectation, they find that accrual mispricing is stronger for larger firms that have greater analyst following and institutional holding than for smaller firms. Furthermore, they argue that the market inefficiency associated with accruals should be mitigated more quickly for firms with lower transaction costs which they measure in terms of volume and stock price. They find that accrual mispricing is greater for firms with low transactions costs (i.e., firms with high volume and high stock price). They find that going long (short) in low (high) accrual firms yields a greater return for firms with high intuitional holdings than for firms with low institutional holdings. They conclude that the accrual mispricing may not be due to the naïve investor earnings fixation hypothesis, but could be possibly be attributable to omitted risk-related factors associated with extreme accruals.

DeFond and Park (2001) suggest that since abnormal accruals do not have any impact on the total lifetime earnings of a firm, they should be priced differently from other components of earnings. They demonstrate that firms whose earnings include abnormal accruals that suppress the magnitude of earnings surprises have higher earnings response coefficient (ERCs) than firms whose earnings are accompanied by abnormal accruals that exaggerate the magnitude of earnings surprises. Consistent with their hypothesis, they find that good news (bad news) firms accompanied by income-decreasing (income-increasing) abnormal accruals experience significantly higher cumulative returns than good news (bad news) firms accompanied by income-increasing (income-decreasing) abnormal accruals over a period of 80 days after the earnings announcement. Based on their results, they conclude that the market anticipates 19-23% of the pricing implications of abnormal

accruals. Their findings lend further support to Xie's (2001) findings on the mispricing of abnormal accruals.

Bradshaw et al. (2001) explore whether the financial intermediaries, namely, the sell-side analysts and the auditors, convey to the investors the future earnings declines associated with high accruals. Specifically, they find large negative (optimistic) analyst forecast errors associated with firms having large income-increasing accruals suggesting that analysts fail to predict the negative association between the future earnings and the current period accruals. They find that the auditors also fail to signal the investors the firms' future declining performance implied in current period accruals, either by way of audit opinions or auditor changes.

Barth and Hutton (2004) investigate whether the analyst forecasts revisions provide information about the persistence of earnings over and above that is obtained from the current period accruals. They find that the analyst forecast revisions are positively related to earnings, indicating that analysts fail to anticipate the future reversals of earnings and accruals associated with current period accruals. They also investigate whether the accrual anomaly is distinct from the analyst revision anomaly depicted by Stickel (1991). Stickel (1991) demonstrated that analyst forecast revisions are positively related to future returns, indicating that investors do not fully incorporate the information in analyst forecast revisions in the period in which the revision is made. Based on Stickel's (1991) results, Barth and Hutton (2003) document that a combined hedge strategy of going long (short) on firms having highest negative (positive) accruals and going long (short) on firms having positive (negative) analyst forecast revisions has significantly higher returns than any one hedge strategy considered by itself. Their results indicate that not only is the accrual

anomaly distinct from the analyst revision anomaly, but also that the analysts fail to comprehend or convey the lack of persistence of accruals in their forecasts.

Abarbanell and Lehavy (2003) explain how the prior inconsistent results related to bias and efficiency of analysts forecasts relate to the asymmetric distribution of analyst forecast errors. Upon analyzing the distributions of analyst forecast errors, they find that a large number of observations with high magnitudes fall on the extreme negative rather than the extreme positive side of the distribution, which they call the tail asymmetry. They also find a higher incidence of small positive errors relative to small negative forecast errors in cross-sectional distributions, which they call the middle asymmetry. Furthermore, they find that the middle asymmetry disappears when firms with abnormal accruals are removed from the distribution, suggesting that analyst pessimism seems to be associated with extreme situations of good performance. Interestingly, they also find that large negative abnormal accruals are associated with large optimistic forecast errors. They offer two possible explanations for this observed pattern. First, non-discretionary accruals are misclassified as discretionary, and analysts under-react to extreme performance of firms, second, analysts fail to anticipate the income-decreasing accrual management activity of firms reflected in extreme negative abnormal accruals.

Richardson (2003) examines whether short sellers are able to comprehend the pricing implications of accruals as reflected in their trading activity. The results of his study suggest that short-sellers donot seem to utilize the information in accruals to maneuver their trading activity. He concludes that either the tests conducted by him are not strong enough to give any conclusive results or that short sellers are unaware of the inverse relation between accruals and future stock returns.

2.2.3 Evidence on Exploitation of the Accrual Anomaly

Beneish and Vargus (2002) study the trading behavior of insiders to investigate if they comprehend and exploit the accrual anomaly. Their pricing tests reveal that income-increasing accruals appear to be over-priced when insiders engage in abnormal selling and rationally priced when insiders engage in abnormal buying. Consistent with Sloan (1996) and Xie (2001), upon conducting a Mishkin (1983) market pricing tests they find that the income-increasing accruals are significantly over-priced for firms that are accompanied by abnormal insider selling than for firms that do not experience any abnormal insider trading. They demonstrate that a hedge-portfolio strategy that combines the knowledge of accruals and abnormal insider selling yields significantly higher returns than a strategy based on the knowledge of accrual mispricing alone. They find that income-increasing accruals are significantly more persistent for firms with abnormal insider *buying* and significantly less persistent for firms with abnormal insider *selling*, relative to firms for which there is no insider trading. Their results suggest that a proportion of insiders comprehend the economic factors underlying the persistence of accruals and therefore, exploit the accrual mispricing profitably.

Collins et al. (2003) investigate whether the presence of institutional ownership is helpful in mitigating the accrual mispricing. Their accrual-based hedge portfolio test reveals that the one year-ahead hedge portfolio returns are significantly lower for the firms with high institutional ownership relative to firms with low institutional ownership. Partitioning the data based on different levels of institutional ownership, they conduct cross-sectional regressions to examine the association between future returns and current period accruals. They find institutional ownership is associated with lower accrual

mispricing even after controlling for factors associated with stock returns and institutional ownership like market value of equity, book to market ratio, and contemporaneous returns. Additionally, they find that firms with lower intuitional holdings are smaller, less profitable and are less liquid firms. They explain that perhaps the risk associated with these firms prevents the institutional investors to arbitrage the accrual anomaly associated with these firms. They also find that annual change in institutional ownership is negatively related to the previous year accruals. Taken collectively, their results indicate that institutional investors comprehend and exploit the accrual anomaly to their advantage and help mitigate the accrual mispricing to some extent.

Zhang and Cready (2003) examine the trading behavior of short sellers to determine if the short-sellers take advantage of the mispricing of accruals. In their yearly analysis, they find that the relative short interest measured after the release of the annual financial results is significantly positively associated with the total and abnormal accruals of a firm. They also conduct a quarterly study in which they estimate separate regressions for each quarter to examine the relation between the quarterly total (abnormal) accruals and the relative short interest measured after the 10-Q filing for each quarter. Specifically, they find that short-sellers go short in the third and fourth quarter of the fiscal year for firms with high income-increasing total and abnormal accruals and thereby, profit from their superior knowledge of the mispricing of accruals.

Another study by Balsam et al. (2002) documents that firms with relatively higher proportion of institutional investors are quicker in reacting to the information in abnormal accruals released in the 10-Q filings. They state that a negative association between unexpected abnormal accruals and cumulative abnormal returns (CAR) around the 10-Q

filings should indicate that investors revise their beliefs about the true value of a firm's earnings upon the receipt of the 10-Q report. Specifically, they find that while the firms with relatively high institutional holdings experience a significant negative association between unexpected abnormal accruals and CAR *prior* to the release of 10-Q report, firms with relatively low institutional holdings experience this negative relation between accruals and CAR *after*[3] the release of 10-Q report. They conclude that the presence of institutional investors helps in faster comprehension of the economic information underlying accruals. Their study provides additional empirical evidence of how investor response to accruals differs with the presence of informed investors.

Lev and Nissim (2004) investigate why accrual anomaly persists till date and has not been arbitraged away by the investors. They find that the change in the institutional ownership in the first quarter of a year to be negatively related to the level of accruals at the beginning of the year. This finding indicates that institutional investors do respond promptly to the accrual anomaly, suggesting that the persistence of the accrual anomaly cannot be attributed to an untimely response by institutional investors. They also find that firms with extreme accruals possess characteristics that are unappealing to institutional investors, i.e., these firms are generally small in size, low priced, and have lower book to market ratios. They demonstrate that since institutions tend to follow more prudent investment strategies, their response to the accrual anomaly is too small in magnitude to arbitrage away the anomaly. Upon further investigation of why the small investors do not exploit the accrual anomaly, they discover that the information and transactions costs associated with the accrual anomaly are too high for individual investors to exploit the anomaly profitably. However, while Lev and Nissim (2004) conclude that high

[3] Over the [-1,+15] window around the release of 10-Q.

transaction costs prevent the accrual anomaly to be exploited in full, another study on the profitability of market anomalies by Bushee and Raedy (2003) shows that the accrual anomaly generates positive abnormal returns even after considering several sources of transaction costs associated with legal constraints, trade size, exchange listing, stock price and market capitalization.

Hence, studies have shown that investors are either slow in reacting to the information in accruals and therefore, misprice them, or they pierce through the accrual veil, discern the underlying economics in accruals and exploit the anomaly profitably. Misrpicng indicates that, on average, investors are not able to discern the information in accruals. This evidence of mispricing, coupled with the evidence of selective accrual comprehension by certain sets of investors suggests that accruals create informational inequalities in the market, increase the informed traders' information advantage and exacerbate information asymmetry in the market.

2.3 Bid-ask Spread, Adverse Selection Component and Information Asymmetry

Information asymmetry is costly for the investors because it enhances the transaction costs they incur while trading in securities. The finance literature considers the bid-ask spread an important component of the total transaction costs incurred by investors while dealing in securities, besides commissions and taxes (Demsetz 1968, Stoll 1978, Cohen et al. 1979, Morse and Ushman 1983). The concept of bid-ask spread emerges from the need for a supplier of immediacy (called the specialist or the market-maker) who stands ready in the market with his bid and ask quotes to execute any unfulfilled orders and to maintain liquidity at all times. The bid price represents the price at which the specialist offers to buy shares in the market. The ask price refers to the price at which the specialist

offers to sell in the market. The difference between these two prices is called the bid-ask spread.

Demsetz (1968) formulates the concept of bid-ask spread as a transaction cost to investors for instant fulfillment of orders in a static demand and supply setting. Smidt (1971) demonstrates that small traders, owing to making smaller and more frequent investments than large traders, tend to be more strongly affected by the services of the specialist and his bid and ask quotes. Bahegot (1971) introduces the concept of information-motivated transactors and liquidity-motivated transactors. He argues that the market-maker tends to suffer a loss when dealing with an early recipient of information that he recoups when dealing with the liquidity traders. In the process, the market maker does not attempt to assign a true value to the security; rather he tries to set the prices in a way so as to balance out the losses from the informed investors through the gains from the liquidity investors. Tinic and West (1974) suggest that the level of trading volume, stock price volatility, and the numbers of securities handled by a specialist are important determinants of the total cost incurred by a specialist. Stoll (1978) identifies the three components of the bid-ask spread namely, the inventory holding cost, the order processing cost and information (adverse selection) cost (discussed in detail later in the section). He provides empirical evidence to demonstrate that the bid-ask spread is negatively related to trading volume and positively related to the level of unsystematic risk associated with a security.

2.3.1 Bid-Ask Spread and Information Asymmetry

The specialist, who stands ready with his bid and ask quotes, tends to lose money when dealing with better-informed investors. He recoups these losses by widening the bid-

ask spread. Hence, the higher the level of information asymmetry, the higher are the losses imposed on the specialist and the wider the spread. Venkatesh and Chiang (1986) argue that a specialist in a firm's stock may be construed as an uninformed trader who is under the risk of heavy losses to informed traders since he or she must be willing to trade at all times. Bid-ask spread is the dealer's source of revenue to offset the expected losses resulting from the trading activity of the informed traders. Hence, the bid-ask spread set by the market specialist is an increasing function of the adverse selection problem perceived by specialists which in turn depends upon the amount of firm-specific information asymmetry in the market.

There is considerable empirical evidence of a positive association between information asymmetry and bid-ask spread. Welker (1995) examines the relation between bid-ask spreads and the disclosure policy of a firm as measured by analysts' evaluation of the firms' overall disclosure efforts published annually in the Association for Investment Management and Research Corporate Information Committee (CIC). Since the level of information asymmetry in the market may be a determining factor for the disclosure policy of a firm, he uses a two-stage simultaneous equation model and documents a negative association between disclosure policy and spreads. Specifically, he finds that the firms with disclosure policy scores falling in the lowest 30% of the disclosure score distribution have spreads that are more than 50% higher than the relative spreads of firms that fall in the top 30% of the distribution. They conclude that owing to the adverse effects of information asymmetry associated with a lower quality of disclosure, firms with lower disclosure scores experience decreased liquidity as evidenced in wider bid-ask spreads.

Greenstein and Sami (1994) examine the change in the level of bid-ask spread for firms that disclose the segment data for the first time in their 1970 10-K reports in compliance with the SEC's 1970 segment disclosure requirement. They find that the decline in the bid-ask spread of such firms subsequent to the 1970 10-K filings is significantly greater than that for the single-segment firms or firms that have been making full-segment disclosures prior to 1970. They also find that this downward shift in the bid-ask spread is a positive function of the number of segments disclosed by such firms. They attribute their results to the reduced information inequalities in the market resulting from greater dissemination segment information to all investors as opposed to it being selectively available to better-informed investors in the past.

Chiang and Venkatesh (1988) investigate whether the percentage of insider holdings and the number of institutions that hold stocks in a firm affect bid-ask spreads. Using a sample of 75 NYSE stocks for the calendar year 1973, they find that while the percentage of insider holdings have a positive and significant relation with the bid-ask spread they find the relation between institutional holdings and bid-ask spread to be insignificant. They conclude that while insiders seem to exacerbate information asymmetry in the market the same is not true of institutional investors, since, consistent with Demsetz's (1986) theory, institutions do not hold as high proportions of stocks as insiders and owing to fiduciary responsibilities do not behave as opportunistic informed investors.

Chung and Charoenwong (1988) find bid-ask spreads to be positively related to the level of insider trading in a firm. They adopt two measures to estimate the level of insider trading: 1) the absolute value of the difference between the number of insider buy transactions and the number of insider sell transactions, and 2) the ratio of the net (buy-

sell) transactions to the total number of transactions for the day. Though, they find the level of insider trading to be positively linked to bid-ask spreads, they do not find higher bid-ask spreads on the days when the insider trading takes place. The results of their study suggest that although the specialist may be not be able to perceive the timing of insider trading, he/she certainly maintains wider spreads for firms having a high level of insider trading.

Boone (1998) investigates the change in quoted bid-ask spreads, resulting from the passing of the Accounting Series Release (ASR) No. 253 by the Securities and Exchange Commission (SEC) in 1978 that made it mandatory for oil and gas firms to disclose the discounted present value of their stock for the fiscal years ending after December 25, 1978. He finds that the value of the quoted spread declined significantly after the release of ASR No. 253. He also finds that this decline in spread had a significant positive association with the absolute magnitude of the difference between the book value and the discounted present value of oil reserves, a hypothesized determinant of the decline in information asymmetry as a results of the an additional value-based disclosure. The results of his study indicate that the unrestricted dissemination of value-relevant information to the all market participants, mandated by ASR No. 253, resulted in creating social benefits as evidenced in reduced transaction costs.

Leuz and Verrecchia (2000) investigate the changes in liquidity experienced by firms that switch from German accounting standards to US GAAP or IAS. They explain that German accounting standards have been criticized for allowing too much discretion to managers since they do not contain the detailed disclosure requirements demanded by the US GAAP, specifically, at the time of unqualified audit opinions. They argue that by

adopting the US accounting standards, firms commit to disclosing much more information to the investors than that is disclosed under German GAAP. In a cross-sectional analysis, they demonstrate that firms that are committed to either IAS or US GAAP have lower bid-ask spread and greater liquidity in the market as compared to the firms using German GAAP. Additionally, they find that firms that switch from German GAAP to IAS or US GAAP experience a decline in spreads accompanied by an increase in share volume around the time of the switch. They attribute this finding to the reduced information asymmetry resulting from a more comprehensive disclosure of financial statements.

Hence, prior literature provides considerable empirical evidence of a positive association between information asymmetry and bid-ask spreads.

2.3.2 Components of Bid-Ask Spread

The market microstructure literature (Stoll 1978, Copeland and Galai 1983, Glosten and Milgrom 1985, Glosten and Harris 1988, Hasbrouck 1988, Stoll 1989, George et al. 1991, Lin, Sanger and Booth 1995, Huang and Stoll 1997) decomposes the bid-ask spread into three cost components: the order processing cost, the inventory holding cost, and the adverse selection cost. The order processing cost represents the compensation to the market maker for instantaneous processing of the buy and sell orders demanded by the investors. It covers all the clerical costs including the communication costs, the infrastructure costs and the dealer's time involved in carrying out a transaction. The inventory holding cost, of the spread compensates the market maker for bearing increased unsystematic risk that arises from holding an undiversified portfolio.

The *adverse selection component*, which is the variable of primary interest in this study, is directly related to the perceived level of information asymmetry in the market. It

represents the profit made by the market maker by trading with liquidity (uninformed) traders that compensates him for the losses incurred in trading with informed traders. The market maker is faced with the problem of trading with better informed investors than he/she.[4] These better-informed investors are likely to buy stocks when the price set by the market maker is low and sell stocks when the price set by the market maker is high. Hence, the market-maker faces an adverse selection problem when dealing with better-informed investors. This problem induces the market maker to revise the price upward after a buy transaction and downward after a sell transaction. These revisions ensure the market maker that he or she receives at least the revised ask price on investor purchases and has to pay no more than the revised bid price on investor sales. Hence, a part of the spread, namely the adverse selection component, is a result of revisions made by the market maker to widen the spread subsequent to informed trades (Copeland and Galai 1983 and Glosten and Milgrom 1985, Lin, Sanger and Booth 1995).

This adverse selection cost varies with the level of information asymmetry among investors in the stock market. "A dealer must select the bid-ask spread wide enough to limit the trades with customers possessing superior information, but narrow enough to attract an adequate number of liquidity-motivated transactions."[5] Finally, it is important to note that market makers seek to maximize the turnover of their inventory and not its value, and thus the market microstructure literature views the market-maker as an uninformed

[4] Kim and Verrecchia (1994) state that, "The ability of information processors to produce superior information assessments of a firm's performance on the basis of an earnings announcement provides them with a comparative information advantage over the market-makers. For example, specialists are not thought to do any fundamental analysis, such as analyzing in great detail the annual reports of the companies whose shares thy trade." Also, see Mayer (1988) who states that "In general, NYSE specialists do not take a view of where the stock is going over time…Some of them do not read the annual reports of companies whose shares they trade."

[5] William F. Sharpe & Gordon J. Alexander, Investments, 45, 4th Edition, 1990.

investor (O'Hara 1995). Thus, one may argue that while market makers are sufficiently astute to perceive (any) accrual-induced information asymmetry and respond to it by widening spreads, they are uninformed with respect to the understanding of accruals.

2.3.3 Adverse Selection Component and Information Asymmetry

Bahegot (1971) was the first to introduce the concept of the adverse selection component of the bid-ask spread. Copeland and Galai (1983) and Glosten and Milgrom (1985) later formalized a model to estimate the adverse selection component. Several other models to estimate the adverse selection component have been formulated since then (Glosten and Harris 1988, Stoll 1989, Lin, Sanger and Booth 1995, George, Kaul, and Nimalendran 1991 (as modified by Neal and Wheatley (1998) to accommodate transactions data), Huang and Stoll 1997, and Madhavan, Richardson, and Roomans 1997).

Extant financial literature demonstrates a positive association between the adverse selection component and firm-specific information asymmetry. Glosten and Milgrom (1985) show that the bid-ask spread is increasing in the number of sophisticated investors relative to liquidity investors. Glosten and Harris (1988) find that the adverse selection cost of the spread is directly related to the perceived level of information asymmetry in the capital market. Stoll (1989) provides empirical evidence that the adverse information component is around 43% of the total spread and is an inevitable component of the spread. Lin, Sanger and Booth (1995) demonstrate that the adverse selection component increases monotonically with the trade-size. They attribute this finding to the informational advantage of the informed investors who generally trade in large quantities.

Krinsky and Lee (1996) analyzed the three components of the spread around earnings announcements. They find that while the inventory holding and order processing

costs decline during earnings announcements, the adverse selection component of the spread increases during the same period. They conclude that the pre-disclosure information asymmetry prevailing in the market increases the adverse selection component just *before* the announcements. Also, they attribute the increase in the adverse selection component *after* the earnings announcement to the differential price revisions made by the investors, consistent with Kim and Verrecchia (1994).

Prior studies have also analyzed the association between different earnings attributes and the adverse selection component. Affleck-Graves et al. (2002) examine the relation between earnings predictability and the adverse selection component for a sample of 247 NASDAQ firms. They measure earnings predictability using analysts' forecast errors and dispersion among analysts' forecasts. They argue that the earnings announcements of firms with less predictable earnings should provide an opportunity for informed investors to trade on their informational advantage, thereby imposing an adverse selection cost on the market-makers who in turn are likely to price protect themselves by widening the spread. Hence, they hypothesize that firms with less predictable earnings should experience an increase in the adverse selection component of the spread during earnings announcements. Consistent with their hypothesis, they find that whereas, there is an increase in the adverse selection cost for low predictability firms, there is no significant change in the adverse selection cost for high predictability firms. They also find that in general, during non-announcements periods, firms with lower earnings predictability firms have significantly higher bid-ask spreads than high predictability firms. Since high transactions costs force firms to provide a higher return to their stockholders, they

conclude that earnings predictability appears to have a more permanent and long-term impact on the cost of capital of firms.

Jain et al. (2004) examine the changes in liquidity, measured in terms of market depth, bid-ask spread and its adverse selection component, during the year 2002 when several big companies (for example, WorldCom, Global Crossing, Xerox, Halliburton, etc.) were being examined for accounting irregularities and financial misstatements that subsequently led to the passing of the Sarbanes-Oxley Act. They demonstrate that while liquidity declined after the financial scandals became public, it improved after the Sarbanes-Oxley Act was passed. Specifically, they find a decrease in depth and depth-to-adverse selection component ratio accompanied by an increase in the spreads after the reported financial scandals. Conversely, they find an increase in depth and depth-to-adverse selection component ratio accompanied by a decrease in the spreads after the passing of the Act. Their results indicate that market liquidity, measured in terms of bid-ask spread, its adverse selection component and depth is directly affected by quality of the information environment.

3. HYPOTHESIS DEVELOPMENT

Accounting accruals convert cash flows into net income by matching expenses with revenues in the period in which they are earned without regard to when the actual cash flow occurs. Accounting accruals also constitute items that represent managements' expectations of uncertain future events, and thus are liable to some degree of measurement error. They also may be biased to the extent that managers intentionally misrepresent their expectations to achieve private gain (i.e., "manage earnings") or convey their private information (Dechow and Dichev 2002).

Henry (2004) notes that because accounting accruals are noisy and perhaps biased measures of future events, investors must incur significant information processing costs to fully understand the valuation implications of the accruals. Such information processing costs include the cost to investors of becoming knowledgeable about accounting accruals or choosing instead to purchase investment insight from others who possess such knowledge. Because there are increasing returns to scale in the production of information, "at relatively low levels of investment, acquisition of information may not be economically justifiable, whereas large investment operations will justify becoming informed" (Lev 1988, p. 6). Thus, some (but not all) investors will find it economically justifiable to "pierce the accrual veil" leading to heterogeneous interpretation of accounting accruals in the capital markets. The heterogeneous interpretation of accruals is suggested in the studies that investigate the investor response to accruals. These studies either indicate that investors, on average, are slow in interpreting accruals as evidenced in accrual mispricing or document that certain sets of informed investors can lift the accrual veil and maneuver their trading activity to profit from the market mispricing of accruals.

Sloan (1996) depicts that investors being slow in comprehending the economics underlying accruals, misprice them in the current year. Xie (2001) demonstrates that much of the misrpicing documented by Sloan (1996) is attributable to abnormal accruals. Collins and Hribar (2000) find that not only does the accrual mispricing hold for the quarterly data, it is also a phenomenon distinct from the post-earnings announcement drift documented by Bernard and Thomas (1989). DeFond and Park (2001) find that the market only partially succeeds in comprehending the mispricing of accruals. Bradshaw et al. (2001) demonstrate that financial intermediaries, such as, sell-side analysts and auditors, fail to convey to the investors the future earnings declines associated with high accruals. His results coincide with that of other studies that mostly indicate that analysts fail to account for the information on future declining performance of firms embedded in current period accruals (Teoh and Wong 2001, Barth and Hutton 2003, Abarbanell and Lehavy 2003).

Despite the evidence of misinterpretation of accruals as reflected in accrual mispricing, there is also evidence suggesting that better informed investors, such as, insiders, institutional investors and speculative short sellers, maneuver their trading activity based on their superior knowledge of accruals for opportunistic profits. Zhang and Cready (2003) document empirical evidence suggesting that short sellers go short for firms with high-income increasing accruals and profit from their mispricing. However, Richardson (2003) finds that short-sellers donot seem to utilize the information in accruals to maneuver their trading activity. Beneish and Vargus (2002) document that insiders engage in significantly more buying when accruals are relatively under-priced and significantly more selling when the accruals are relatively over-priced. Likewise, empirical evidence (Collins 2003, Lev and Nissim 2004, Balsam et al. 2001) suggests that

institutional investors comprehend and trade on the information related to future stock price decline contained in accruals and help mitigate some of the mispricing resulting from accruals. These results coincide with the anecdotal evidence provided by Henry (2004) who reports that investment firms like Goldman Sachs Asset Management, Barclays Global Investors, Jefferson Research and Management and Susquehanna Financial Group, among others, are exploiting the accrual anomaly to make portfolio investment decisions.

Hence, studies have shown that investors are either slow in reacting to the information in accruals and therefore, misprice them or they pierce through the accrual veil, discern underlying economics in accruals and exploit the anomaly profitably. Mispricing indicates that, *on average*, investors are not able to discern the information in accruals. This evidence of mispricing coupled with the evidence of selective accrual comprehension by certain sets of investors suggests that accruals create informational inequalities in the market, increase the informed traders' informational advantage and exacerbate information asymmetry in the market.

Lev (1988, p.1) argues that, "information asymmetries across investors lead to adverse private and social consequences: higher transaction costs, thin markets, lower liquidity of securities, and in general decreased gains from trade." In sum, the higher the absolute magnitude of accruals, the higher the accrual mispricing and its exploitation by informed investors, the greater the losses imposed on the specialist and the wider the spreads. Hence, I hypothesize a positive association between accruals and spreads. Furthermore, I take absolute values of total and abnormal accruals in my study because prior studies on accrual mispricing and selective accrual comprehension mainly relate to both positive and negative values of accruals. Therefore, I argue that the higher the

magnitude of accruals, the higher should be their heterogeneous comprehension and the resultant information asymmetry, regardless of their sign. Hence, since I focus on magnitude of accruals and not their direction, I employ the absolute values of accruals in my study.

Glosten and Milgrom (1995) and Easley and O'Hara (1987a) suggest that the trading activity of the informed investors also 'signals' their private information to the market. The speed with which private information becomes impounded in prices also impacts the magnitude of losses imposed on the uninformed traders (O'Hara 1995). Informed investors tend to trade in the market until prices attain their full-information level. As O'Hara (1995) discusses, the rate at which prices attain full-information value is in part determined by the degree of competition among informed investors. Under conditions of low competition among informed investors, informed trading is done in small quantities to prevent private information from quickly reflecting into prices (Kyle 1984). This trading strategy implies that any widening of the spread resulting from the private information induced by accruals could take place over fairly long periods of time. Therefore, I study the posited linkage between accruals and spreads in a general non-event setting for all trading activity occurring for firms.

On the other hand, if the number of informed investors in the market is large, they are more likely to behave competitively (Easley and O'Hara (1987a). In such a case, they would trade in large quantities to quickly reap the profits of their information before the prices move to their true value. Therefore, any widening of spreads from the release of any information should be confined to a fairly short window. To analyze this phenomenon, I

also study the association between accruals and spreads around the initial release of the accrual information.

I test the posited hypothesis of a positive linkage between accruals and spreads using (1) both total and abnormal accruals, (2) both the total and adverse selection component of the spreads in (3) both general and event settings. Thus, I propose to test the following eight hypotheses:

For a general setting (alternate form):

H1a: The bid-ask spread is positively related to the absolute magnitude of total accruals.

H1b: The bid-ask spread is positively related to the absolute magnitude of abnormal accruals.

H1c: The adverse selection component of the spread is positively related to the absolute magnitude of total accruals.

H1d: The adverse selection component of the spread is positively related to the absolute magnitude of abnormal accruals.

For an event setting (alternate form):

H2a: The increase in the bid-ask spread during the initial release of accrual information is positively related to the absolute magnitude of total accruals.

H2b: The increase in the bid-ask spread during the initial release of accrual information is positively related to the absolute magnitude of abnormal accruals.

H2c: The increase in the adverse selection component during the initial release of accrual information is positively related to the absolute magnitude of total accruals.

H2d: The increase in the adverse selection component during the initial release of accrual information is positively related to the absolute magnitude of abnormal accruals.

4. SAMPLE SELECTION AND DESCRIPTIVE STATISTICS

4.1 Sample Selection

I choose my sample period from 1994-2001, the time period for which data for all the variables under study is available. I restrict my sample to the New York Stock Exchange (NYSE) because NYSE stock prices are more sensitive to changes in quotes. The NYSE quotes mostly display or determine the best displayed quotes, and the NYSE is the most frequent initiator of quote changes (Blume and Goldstein 1997). The greater the sensitivity of the prices to the changes in quotes, the finer will be the measure of the adverse selection component because the Lin, Sanger and Booth (1995) model that I use to calculate the adverse selection component captures the correlation between changes in quotes resulting from changes in prices. Moreover, firms listed on the same stock exchange are subject to the same market order execution process, the exchange-related regulations, and monitoring by external agencies that helps ensure uniformity in the sample and controls for any firm-specific factors that may differ across stock exchanges.

I employ three samples in my study – first, for the yearly analysis, second, for the quarterly event study around earnings announcements and third, for the quarterly event study around the 10-Q/10-K dates. For the yearly study, I adopt the following sample selection criteria to arrive at the final sample:

1) The firm is listed on the New York Stock Exchange (NYSE).

2) The firm does not belong to the Financial Services (SIC 6000-6999) or regulated utilities (SIC 4800-4829 & 4910-4919) industry. [6]

[6] I exclude these firms because owing to the nature of these firms, either their accruals do not confirm with the general definition of accruals as defined for manufacturing firms or their financial statements are

2) The data for the accounting variables used in the study is available in the Standard and Poor's Research Insight Database.

3) The information for the stock market variables like stock returns and volume is available on the Center for Research in Security Prices (CRSP) database.

4) The data for the stock prices and bid-ask quotes is available in the NYSE Trade and Quotes (TAQ) database.

5) The information related to financial analyst forecasts and analyst following is available in the (Institutional Broker's Estimation System) IBES database.

6) The firm has institutional holdings data available on the Compact Disclosure database.

Consistent with previous studies (Huang and Stoll [1997], Jain et al. [2004]), I adopt the following data filters for the Trade and Quotes (TAQ) data and delete trades and quotes:[7]

- If either the bid or the ask price is negative;
- If either the bid size or ask size is negative;
- If the bid-ask spread is greater than $4 or negative;
- If they are out of time sequence;
- Delete before-the-open and after-the-close trades and quotes;
- If the price or volume is negative;
- If they changed by more than 10% compared to last tick.

Table 1 reports the sample selection procedure for the annual data. First, I obtain 29,360 firm-year observations for the sample period 1994-2001 that are listed on the NYSE from the Research Insight database. After removing the firms belonging to the financial services or the regulated utilities industry, I am left with 18,112 firm-year observations. After deleting observations with incomplete accounting data in Research

presented as per the regulatory requirements in such a way that the information obtained about their accruals is ambiguous.

[7] I adopt these filters because data having these characteristics is either likely to be unrealistic or incorrect.

Table 1 - Sample Selection Procedure for Annual Data

	Observations Lost	Surviving Observations
Firm-Year Observations from 1994-2001 listed on NYSE in Research Insight database		29,360
Less: Observations in the regulated utility industry (SIC 4800 - 4829, 4910 – 4919)	(812)	28,548
Less: Observations in the financial services industry (SIC 6000 – 6999)	(10,436)	18,112
Firm-year observations in manufacturing, merchandizing and service industry		**18,112**
Less: Observations with incomplete data in Research Insight	(8,850)	9,262
Less: Observations with incomplete data in IBES	(2,812)	6,450
Less: Observations with missing data in CRSP	(101)	6,349
Less: Observations with missing data in TAQ (Transactions and Quotes) database	(878)	5,471
Less: Observations with incomplete institutional ownership data in Compact Disclosure database	(94)	5,377
Firm-year observations used in the study		**5,377**

Distribution of Observations by Year	
Year	**No. of Firms**
1994	287
1995	616
1996	685
1997	742
1998	783
1999	766
2000	757
2001	741
Total Firm-Year Observations	**5,377**

Table 2 - Sample Selection Procedure for the Quarterly Event Study

Steps in Sample Selection	Around Earnings Announcements		Around TenQ/TenK dates	
	Observations Lost	Surviving Observations	Observations Lost	Surviving Observations
Firm-Quarter Observations from 1995-2002 listed on NYSE in Research Insight database		104,480		104,480
Less: Observations in the regulated utility industry (SIC 4800 - 4829, 4910 – 4919)	(2,496)	101,984	(2,496)	101,984
Less: Observations in the financial services industry (SIC 6000 – 6999)	(39,488)		(39,488)	
Firm-quarter observations in manufacturing, merchandizing and service industry		62,496		62,496
Less: Observations with incomplete data in Research Insight	(33,381)	29,115	(33,381)	29,115
Less: Observations with incomplete data in IBES	(7,846)	21,269	(7,846)	21,269
Less: Observations with missing data in CRSP	(549)	20,720	(4,806)	16,463
Less: Observations with missing data in TAQ (Transactions and Quotes) database	(4,991)	15,729	(4,136)	12,327
Firm-quarter observations used in the study		**15,729**		**12,327**

Insight, I am left with 9,262 observations. I remove 2,812 firm-year observations for which the analyst related information is unavailable in the IBES database. I eliminate 101 firm-year observations for which complete information on stock returns and volume is not available in CRSP database. Then 878 firm-year observations are lost due to unavailability of data in TAQ database. After removing another 94 observations for which the data on institutional holdings is not available in the Compact Disclosure database, I am left with a final sample of 5,377 firm-year observations for which data for all the variables required in the annual study is available.

Likewise, for the quarterly samples, I remove observations for which data related to any of the variables used in the quarterly study is missing. In addition, for the quarterly study around earnings announcements I remove observations for which the earnings announcement dates are not available either in IBES or Research Insight. Similarly, for the study around the 10-Q/10-K filing dates, I delete the observations for which the 10-Q/10-K filing dates are not available on the SEC website. Employing the sample selection criteria depicted in Table 2, I finally have 15,729 firm-quarter observations for the quarterly event study around earnings announcements and 12,327 firm-quarter observations for the quarterly event study around the 10-Q/10-K dates.

4.2 Industry-wise Distribution of Sample Firms

Table 3 presents the industry-wise distribution of the firm-year observations. The sample is representative of 51 industries. The maximum percentage representation of any one industry does not exceed 7.98% (Electric, Gas and Sanitary Services). Overall, the data seems to be quite evenly distributed over the different kinds of industries with no industry depicting an overly heavy representation.

Table 3 - Distribution of Firms by Industry

Industry	SIC Code	Number of Firms	Percentage
Mining	10, 14	7	0.56
Energy	13	71	5.73
Construction	15	19	1.53
Food and Kindered Products	20	32	2.58
Textiles	22	7	0.56
Apparel and Other Finished Products	23	15	1.21
Lumber and Wood Products	24	8	0.65
Furniture and Fixtures	25	10	0.81
Paper and Allied Products	26	31	2.5
Printing, Publishing and Allied Products	27	37	2.98
Chemicals and Allied Products	28	102	7.98
Petroleum-related	29	17	1.37
Rubber, Plastic and Leather Products	30	18	1.45
Leather and Leather Products	31	6	0.48
Stone, Clay and Glass related Products	32	17	1.37
Primary Metal Industry	33	34	2.74
Fabricated Metal	34	23	1.85
Machinery and Computer Equipment	35	86	6.94
Electrical Equipment	36	69	5.56
Transportation Equipment	37	50	4.03
Measurement and other Instruments	38	59	4.76
Miscellaneous Products	39	1	0.08
Railroad Transportation	40	9	0.73
Transit and Passenger Transportation	41	1	0.08

Table 3 – Contd.

Industry	SIC Code	Number of Firms	Percentage
Motor Freight and Warehouse Transportation	42	5	0.4
Water Transportation	44	4	0.32
Air Transportation	45	12	0.97
Transportation	47	1	0
Communications	48	27	2.18
Electric, Gas and Sanitary Services	49	92	7.42
Wholesale Trade - Durable	50	30	2.42
Whole Sale Trade - Non-Durable	51	18	1.45
Building Material, etc.	52	2	0.16
General Merchandise	53	20	1.61
Food Stores	54	17	1.37
Auto Dealers, Gas Stations	55	11	0.89
Apparel and accessory Stores	56	19	1.53
Home Furniture and Equipment Stores	57	12	0.97
Eating and Dining Places	58	17	1.29
Miscellaneous Retail	59	28	2.26
Meals	70	14	1.13
Personal Services	72	6	0.48
Business Services	73	89	7.18
Auto related Services	75	6	0.48
Motion Pictures	78	5	0.4
Amusement and Recreation Services	79	18	1.45
Health Services	80	32	2.58
Educational Services	82	5	0.4
Social Services	83	4	0.32
Engineering Services	87	17	1.37
Public Administration	99	4	0.32
Total number of Firms		**1,244**	**100**

4.3 Descriptive Statistics - Annual Data

Table 4 (Table 5) presents the regression models and the definitions of the variables used in the annual (quarterly) study. These models and variables are discussed in detail in Section 5.3 on Hypothesis Development. Table 6 presents the descriptive statistics of the variables employed in the annual study for the 5,377 firm-year observations over the period 1994-2001. The total accruals range from -0.6557 to a maximum of 0.2707 indicating that at the maximum, income-decreasing accruals are 65.57% of total assets; whereas the income-increasing accruals are a maximum of 27.07% of total assets. The mean total accruals are -0.0574 with the median being -0.0495, indicating that on average the magnitude of income-decreasing accruals is greater than the magnitude of income-increasing accruals. The mean (median) abnormal accruals are -037% (-0.15%) of total assets with the maximum value of income-decreasing abnormal accruals being 32.97% and the maximum value of income-increasing abnormal accruals being 30.97% of total assets.

Bid-ask spreads range from a minimum of .09% to a maximum of 5.14% of the quote mid-point. On average the bid-ask spreads are 0.74% with the median being 0.56% of the quote mid-point. Welker (1995), on the other hand, reports a mean total spread of 1.02 % with the median being .84% of the stock price obtained for the sample period ranging from 1990-91. It is evident that the spreads have declined over time especially after the changes in tick rule introduced by NYSE in 1997. Goldstein and Kavajecz (2000) document that spreads have declined by a total of 14.3% after NYSE passed a rule to bring down the minimum variation in the spreads from $1/8^{th}$ to $1/16^{th}$ of a dollar per share. The adverse

Table 4 - Regression Models and Variable Definitions for the Yearly Analysis

The four regressions models used in the yearly analysis and their variable definitions are given below:

$$ln(BID\_ASK_{it}) = \alpha_1 + \alpha_2(ln|(TOT\_ACC_{,it}|) + \alpha_3(ln(VOL_{it})) + \alpha_4(ln(SIZE_{it-1})) + \alpha_5(ln(DISP_{it})) + \alpha_6(ln\ (AFOL_{it})) + \alpha_7(ln\ (PIH_{it})) + \alpha_8(ln(STDRET_{it})) + \varepsilon_{it} \quad (3)$$

$$ln(BID\_ASK_{it}) = \alpha_1 + \alpha_2(ln(|AB\_ACC_{it}|) + \alpha_3(ln(VOL_{it})) + \alpha_4(ln(SIZE_{it-1})) + \alpha_5(ln(DISP_{it})) + \alpha_6(ln\ (AFOL_{it})) + \alpha_7(ln\ (PIH_{it})) + \alpha_8(ln(STDRET_{it})) + \varepsilon_{it} \quad (4)$$

$$ln(ADV\_SEL_{it}) = \alpha_1 + \alpha_2(ln|TOT\_ACC_{it}|) + \alpha_3(ln(VOL_{it})) + \alpha_4(ln(SIZE_{it-1})) + \alpha_5(ln(DISP_{it})) + \alpha_6(ln\ (AFOL_{it})) + \alpha_7(ln(PIH_{it})) + \alpha_8(ln(STDRET_{it})) + \varepsilon_{it} \quad (5)$$

$$ln(ADV\_SEL_{it}) = \alpha_1 + \alpha_2(ln|AB\_ACC_{it}|) + \alpha_3(ln(VOL_{it})) + \alpha_4(ln(SIZE_{it-1})) + \alpha_5(ln(DISP_{it})) + \alpha_6(ln\ (AFOL_{it})) + \alpha_7(ln(PIH_{it})) + \alpha_8(ln(STDRET_{i})) + \varepsilon_{it} \quad (6)$$

BID_ASK_{it}	=	Annual average daily bid-ask spread for firm *i* for year *t*;
ADV_SEL_{it}	=	Annual average daily adverse selection component of firm *i* for year *t* computed using the Lin, Sanger and Booth (1995) model;
TOT_ACC_{it}	=	Earnings before extraordinary items and discontinued operations less operating cash flow (from continuing operations) for firm *i* for year *t*;
AB_ACC_{it}	=	Abnormal accruals obtained using the Jones (1991) model adjusted for growth and performance for firm *i* for year *t*;
VOL_{it}	=	Average daily number of outstanding shares of firm i traded over the year *t*;
$SIZE_{it-1}$	=	Market capitalization of firm *i* at the beginning of year *t* ;
$DISP_{it}$	=	Average standard deviation across analysts' forecasts divided by the absolute value of mean analyst forecast for firm *i* for year *t*;
$AFOL_{it}$	=	Number of analysts following firm *i* for year *t*;
PIH_{it}	=	Percentage of institutional holding for firm *i* for year *t*;
$STDRET_{it}$	=	Standard deviation of daily stock returns for firm *i* for year *t*.

Table 5 – Regression Models and Variable Definitions for the Quarterly Study

The four regressions models used in the quarterly analysis and their variable definitions are given below:

$$ln(AB\_BID\_ASK_{it}) = \alpha_1 + \alpha_2(ln|TOT\_ACC_{it}|) + \alpha_3(ln(ABVOL_{it})) + a_4(ln|UE_{it}|) + \alpha_5(ln(SIZE_{it-1})) + a_6(ln|LAG_{it}|) + \varepsilon_{it} \quad (7)$$

$$ln(AB\_BID\_ASK_{it}) = a_1 + a_2(ln|AB\_ACC_{it}|) + \alpha_3(lnABVOL_{it})) + a_4(ln|UE_{it}|) + \alpha_5(ln(SIZE_{it-1})) + a_6(ln|LAG_{it}|) + \varepsilon_{it} \quad (8)$$

$$ln(AB\_ADV\_SEL_{it}) = \alpha_1 + \alpha_2(ln|TOT\_ACC_{it}|) + \alpha_3(ln(ABVOL_{it})) + a_4(ln|UE_{it}|) + \alpha_5(ln(SIZE_{it-1})) + a_6(ln|LAG_{it}|) + \varepsilon_{it} \quad (9)$$

$$ln(AB\_ADV\_SEL_{it}) = \alpha_1 + \alpha_2(ln|AB\_ACC_{it}|) + \alpha_3(ln(ABVOL_{it})) + a_4(ln|UE_{it}|) + \alpha_5 ln(SIZE_{it-1})) + a_6(ln|LAG_{it}|) + \varepsilon_{it} \quad (10)$$

$AB\_BID\_ASK_{it}$	=	Natural log of average daily bid-ask spread during the earnings announcement (10Q /10K) window less the natural log of annual daily bid-ask spread for firm *i* quarter *t*;
$AB\_ADV\_SEL_{it}$	=	Daily average of the natural log of adverse selection component during the earnings announcement (10Q/10K) window less the daily annual average of the natural log of the adverse selection component of firm *i* for quarter *t* computed using the Lin, Sanger and Booth (1995) model;
TOT_ACC_{it}	=	Earnings before extraordinary items and discontinued operations less operating cash flow (from continuing operations) for firm *i* for quarter *t*;
AB_ACC_{it}	=	Abnormal accruals obtained using the Jones (1991) model adjusted for growth and performance for firm *i* for quarter *t*;
$ABVOL_{it}$	=	Natural log of average daily number of outstanding shares of firm *i* traded during the earnings announcement (10Q/10K) window less the natural log of average daily number of outstanding shares of firm *i* traded over the quarter *t*;
UE_{it}	=	The difference between actual EPS for quarter *t* and the expected EPS scaled by the expected EPS, where the expected EPS is calculated as the mean of the last forecast of every analyst reporting a forecast on IBES for firm *i* for quarter *t*;
$SIZE_{it-1}$	=	Market capitalization of firm *i* at the beginning of quarter *t*;
LAG_{it}	=	Unexpected lag in earnings announcement measured as the difference between the number of days after the fiscal quarter-end the earnings were announced in the current quarter and the previous quarter.

Table 6 - Descriptive Statistics of the Variables employed in the Yearly Analysis
N = 5,377

Variables	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
BID_ASK	0.0009	0.0033	0.0074	0.0056	0.0092	0.0514	0.0068
ADV_SEL	0.0676	0.3517	0.4089	0.4136	0.4746	0.6402	0.0985
TOT_ACC	-0.6557	-0.0882	-0.0574	-0.0495	-0.0145	0.2707	0.0968
AB_ACC	-0.3297	-0.0343	-0.0037	-0.0015	0.0296	0.3097	0.0741
VOL	8329.1339	77807.2581	613845.4579	212088.2076	580191.6561	10736051.9840	1232079.5508
Ln(VOL)	9.0275	11.2620	12.2941	12.2648	13.2711	16.1891	1.4359
SIZE	55.9689	500.9393	5347.7235	1224.2880	3617.1363	133636.4652	14682.5300
Ln(SIZE)	4.0248	6.2165	7.2823	7.1101	8.1934	11.8029	1.4869
DISP	0.0000	0.0183	0.1696	0.0432	0.1150	4.5826	0.4920
AFOL	3.0000	6.0000	12.3915	10.0000	17.0000	42.0000	8.4548
PIH	0.0010	45.0100	58.3031	61.8000	74.8400	99.9900	22.0714
STDRET	0.0088	0.0194	0.0272	0.0250	0.0326	0.0740	0.0112

selection component ranges from a minimum of 6.76% to a maximum of 64.02% of the total spread. Consistent with prior studies the average adverse selection component is 40.89% with the median being 41.36%. Stoll (1978) documents that the adverse selection component is around 43% of the total spread. Van Ness et al. (2001) find the adverse selection component of the spread to be 45.2%, having a median of 43.8% for a sample of 856 stocks listed on NYSE during 1999. Volume, measured as the annual average of total number of shares traded in a day, takes a minimum value of 8,329 shares to a maximum of 10.73 million shares, with the average daily number of shares traded being 613,845. Size, measured as the market capitalization of the common stock outstanding at the end of the year,[8] ranges from $55.96 million to $133,636 million with the average being $5,348 million.

The average analyst forecast dispersion, measured as the average standard deviation of analysts' forecasts divided by the absolute value of the mean analyst forecast, is .1696 with a median of .0432, the maximum being 4.58 and the minimum being 0. The mean (median) analyst following is 12.4 (10) with a minimum of 3 and a maximum of 42. The average (median) percentage of institutional holding is 58.2% (61.79%) which is higher than the figures reported by the previous studies. For example, Balsam et al. (2002) report a mean (median) percentage of institutional holding of 49.9% (52.5%) for a sample period of 1996-98. The volatility in daily stock return ranges from a minimum of .0088 to a maximum of .074, having a mean of .0272 and a median of .0250. This volatility is quite

[8] Compustat data item #25 times Compustat data item # 199

consistent with the mean and median stock return volatility of .03 and .028 reported by Van Ness et al. (2001) for the sample period April-June 1999.

4.4 Descriptive Statistics - Quarterly Study Around Earnings Announcements

Panel A of Table 7 reports the descriptive statistics of the quarterly event study around earnings announcements. The abnormal bid-ask spread measured as the difference between the average daily spread during the announcement window and the average daily spread during the year has a minimum of -0.8934 and a maximum of 2.0768 with a mean and a median of 0.0700 and -0.0024 respectively. The abnormal adverse selection component, measured as the difference between the average daily adverse selection component during the event window and annual average daily adverse selection competent, has a mean (median) of 14.6% (14.0%) of the total spread, with the minimum and maximum values being -0.3300 and the 0.3438 respectively. Once again the quarterly total accruals are skewed to the left, implying that on average, the magnitude of income-decreasing accruals is greater than that of income-increasing accruals. The mean (median) quarterly total accruals are 4.51% (3.71%) of the total assets with the maximum income-decreasing accruals being 33.26% and maximum income-decreasing accruals being 18.89% of total assets. The quarterly abnormal accruals range from -17.74% to 17.26% of total assets. The mean and median abnormal accruals are -0.18% and -0.19% of total assets respectively.

Abnormal volume, measured as the difference between the natural log of the average daily number of shares traded during the announcement window less the natural

Table 7
Panel A: Descriptive Statistics of the Variables Employed in the Quarterly Study Around Earnings Announcements
N = 15,729

Variables	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
AB_BID_ASK	-0.8934	-0.1652	0.0700	-0.0024	0.1805	2.0768	0.4414
AB_ADV_SEL	-0.3300	-0.0670	0.0146	0.0140	0.0974	0.3438	0.1251
TOT_ACC	-0.3326	-0.0835	-0.0451	-0.0371	-0.0029	0.1889	0.0718
AB_ACC	-0.1774	-0.0256	-0.0018	-0.0019	0.0218	0.1726	0.0477
ABVOL	-1.7019	-0.2484	0.4384	0.2149	0.8540	4.4903	1.0891
Ln(SIZE)	4.0339	6.2185	7.2877	7.1167	8.2125	11.8923	1.5134
UE	-5.3915	0.0000	0.0414	0.0233	0.0944	6.1250	0.7752
LAG	-54.0000	-3.0000	0.5875	0.0000	6.0000	50.0000	13.5125

Panel B: Descriptive Statistics of the Variables Employed in the Quarterly Study Around 10Q/10K Filing Dates
N = 12,327

	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
AB_BID_ASK	-0.9363	-0.1565	0.0093	-0.0077	0.1534	1.1529	0.3061
AB_ADV_SEL	-0.3249	-0.0761	0.0000	-0.0013	0.0768	0.3171	0.1171
TOT_ACC	-0.2935	-0.0753	-0.0405	-0.0323	-0.0010	0.1588	0.0666
AB_ACC	-0.1639	-0.0247	-0.0021	-0.0020	0.0202	0.1666	0.0449
ABVOL	-2.1249	-0.5949	-0.0488	-0.1876	0.2485	4.4107	0.9810
Ln(SIZE)	4.2632	6.3366	7.3960	7.2170	8.2985	11.9284	1.4919
UE	-4.5000	0.0001	0.0537	0.0244	0.0968	5.5556	0.6907
LAG	-55.0000	-5.0000	-1.0311	-1.0000	2.0000	42.0000	12.2732

Note: The descriptive statistics reported in this table are for the raw values and the not the log-transformed values of the variables used in the study.

log of the average daily number of shares traded during the year, ranges from a minimum of -1.7019 to a maximum of 4.4903 having a mean (median) of 0.4384 (0.2149).

The unexpected earnings (UE) range from being -5.39 times to 6.125 times of the mean analyst forecast earning per share.[9] Ln(SIZE), measured as the natural log of the market capitalization of a firm at the end of each quarter is quite comparable with the figures of the annual data having a mean (median) of $ 7.283 million ($7.1101 million). The variable LAG, measured as the difference between the number of days after the quarter-end the earnings were announced in the current quarter and the previous quarter, has a mean (median) of 0.5875 (0) days.

4.5 Descriptive Statistics - Quarterly Study Around 10-Q/K Filing Dates

Panel B of Table 7 reports the descriptive statistics of the quarterly event study around 10-Q/K filing dates. The abnormal bid-ask spread ranges from -0.9363 to 1.1529 with a mean (median) of 0.0700 (-0.0077) while the abnormal adverse selection component of the spread ranges from a minimum of -0.330 to maximum of 0.3438 with a mean (median) of 0.0146 (-0.0013). The mean values of the abnormal spreads are lower around the 10-Q/K filing dates than those around the earnings announcements indicating that the increase in the spreads during the 10-Q/K filing dates is smaller than that during earnings announcements. The values of total (abnormal) accruals are quite comparable to those during the earnings announcement study having a mean of -.0405 (-0.0323) respectively. The mean (median) abnormal volume is -0.0488 (-0.1876) having minimum of -2.2149 and a maximum of 4.4107. Once again, the figures observed for abnormal volume around the 10-Q/K filing dates are lower than those around the earnings announcement dates

[9] Unexpected earnings (UE) are measured as the difference between actual EPS for quarter *t* and the expected EPS scaled by the expected EPS, where the expected EPS is calculated as the mean of the last forecast of every analyst reporting a forecast on IBES for firm *i* in quarter *t*.

indicating that the increase in volume during the earnings announcements is more pronounced than that during the 10-Q/K filing dates.

Ln(SIZE), measured as the natural log of the market capitalization of a firm ranges from a minimum of $4.2632 million to a maximum of $11.9284 million with a mean and median of $7.396 and $7.217 million respectively. On average, the size of the sample firms for the event study around the 10-Q/K filing dates appears to be larger than the firms used in the event study around earnings announcements. Since the sample firms used in the 10-Q/K study are restricted to those for which the 10-Q/K filing dates were available, it is plausible that the 10-Q/K filing dates are more easily available for relatively larger firms. Furthermore, any skewness observed in the variables should not pose a problem in the analysis because I take natural logarithm of all the variables in the regression models, consistent with previous studies that have documented a log-linear relationship between the spreads and the variables associate with spreads.

5. RESEARCH DESIGN AND HYPOTHESIS TESTING

I test the posited relationship between accruals and spreads both in an event setting and a general setting using two alternative measures of accruals and two alternative measures of spreads. The event tests are treatment-response type tests and thus potentially offer the strongest internal validity. However, event-type tests are limited because of two reasons. First, they require knowledge of the point in time when accrual information becomes known to the subset of sophisticated investors who then process the public accrual information into private information based on their superior ability to understand accruals. Second, it is difficult to identify the points in time when the better-informed investors trade based on the information in accruals because theory suggests that the speed at which informed investors trade in the market also depends upon the degree of competition among them (O'Hara 1995) . Moreover, capturing this "event" may be problematic if the trading losses sustained by the exchange specialist accrue slowly over time rather than at a discrete point in time in response to large order imbalance caused by sophisticated investors exploiting the mispricing. Based on these considerations, I structure both general (non-event) tests for all trading activity occurring for firms and event tests around earnings announcements. The general (non-event) tests are based on the annual values of the variables and the event tests are structured around quarterly earnings announcement windows and around the 10-Q/K filing dates.

Since the empirical evidence on mispricing of accruals and its exploitation by the informed investors relates to both total and abnormal accruals, both could be a potential source of information asymmetry in the market. Hence, in my study, I measure accruals

using both total accruals and abnormal accruals. I estimate the abnormal accruals using the Dechow et al. (1996) modified Jones model.

I measure spreads as both the quoted bid-ask spread and the adverse selection spread component. While the adverse selection component is the construct of interest, it cannot be directly observed and must be empirically estimated using the Lin, Sanger and Booth (1995) model. Since the resulting measure of the adverse selection spread component is a noisy measure, I also use the total bid-ask spread as an alternative measure for comparison.

5.1 Estimation of Abnormal Accruals

I estimate annual abnormal accruals for the non-event study and quarterly abnormal accruals for the event study using the cross-sectional Jones Model (1991) for each two-digit Standard Industrial Classification (SIC) codes. I use the cross-sectional Jones (1991) model because the cross-sectional model removes the problem of survivorship bias and improves the precision of the estimates due to a larger sample size (DeFond and Jiambalvo 1994 and Subramanyam 1996).[10] However, a major criticism of the Jones (1991) model is the omitted variables problem particularly with regard to growth and performance (McNichols 2000, McNichols 2002, Dechow 2003 and Kothari et al. 2005). To address this issue, I include return on assets (ROA)[11] as a measure of performance and book-to-market ratio (B/M) to capture growth-related effects in the model.

[10] I also run alternate tests using performance-matched abnormal accruals (Kothari et al. 2005).
[11] Consistent with Kothari et al. (2005), who use ROA to estimate the performance-matched abnormal accruals, I also employ ROA to control for performance in the modified Jones (1995) model.

I calculate total accruals as the difference between earnings before extraordinary items and cash flow from operations scaled by total assets at the beginning of the period.[12] I estimate abnormal accruals as the residual from the following equation:

$$TAC_{it}/TA_{it-1} = \alpha_1(1/TA_{it-1}) + \alpha_2[(\Delta REV_{it})/TA_{it-1}] + \alpha_3(PPE_{it}/TA_{it-1}) + \alpha_4(ROA_{it-1}) + \alpha_5(B/M_{it}) + \varepsilon_{it} \quad (1)$$

Where,

TAC_{it} = Earnings before extraordinary items and discontinued operations less operating cash flow (from continuing operations) for firm *i* for period *t*;[13]

TA_{it-1} = Total assets for firm *i* at the beginning of period *t* (Compustat data item # 6);

ΔREV_{it} = Change in revenue (Compustat data item # 12) from the last period for firm *i* for period *t*;

PPE_{it} = Gross property, plant and equipment for firm *i* for the period *t*;[14]

ROA_{it-1} = Income before extraordinary items scaled by total assets at the beginning of the period for firm *i* for period *t*;[15]

B/M_{it} = Ratio of book value of common equity to market value of common equity for firm *i* for period *t;*[16]

5.2 Estimation of the Adverse Selection Component

I adopt the Lin, Sanger and Booth (1995) model to estimate the adverse selection component of the spread. Their model estimates the adverse selection component based on the revisions in the expectations of the market-maker subsequent to a previous trade. I choose this model in view of results of two recent studies (Van Ness et al. 2001, Chung and Li 2003) that indicate that the Lin, Sanger and Booth (1995) model performs better than some other models and actually measures the adverse selection problem faced by the market maker due to informed trading in the market. Van Ness et al. (2001) evaluate the

[12] For the general (non-event) study, the period refers to the fiscal year and for the event study, it refers to the fiscal quarter.

[13] Compustat data item #123 – (Compustat data item # 308 – Compustat data item # 124).

[14] Compustat data item # 7.

[15] Since accruals also go into the determination of earnings and therefore, return on assets, I use ROA_{it-1} rather than ROA_{it} in order to avoid any simultaneity effects between accruals and spreads. I use Compustat data item # 18 / Compustat data item # 6 to estimate *ROA*.

[16] [(Compustat data item # 60) / (Compustat data item # 25)] * (Compustat data item # 199).

performance of five models that evaluate the adverse selection component of the spread - Glosten and Harris (1988), George, Kaul, and Nimalendran (1991) (as modified by Neal and Wheatley (1998) to accommodate transactions data), Huang and Stoll (1997), Lin, Sanger and Booth (1995), and Madhavan, Richardson, and Roomans (1997). They find that estimates obtained from only two out of those five models, namely, the Glosten and Harris (1988) and the Lin, Sanger and Booth (1995), have the expected relation with the proxies of informed trading.

Another recent study by Chung and Li (2003) also verifies the validity of the Glosten and Harris (1988) and Lin, Sanger and Booth (1995) models by finding a positive correlation between the estimates of adverse selection cost obtained from these models and the percentage of informed trading. These findings suggest that the estimates obtained from the Lin, Sanger and Booth model should be a suitable measure of the adverse selection cost of the spread.

5.2.1 Lin, Sanger and Booth (1995) Model

Let B_t represent the bid price at which the specialist executes sell orders and let A_t represent the ask price at which the specialist executes buy orders for the investors at time *t*. Let Q_t be the mid-point of the quoted bid-ask spread at time *t*. Therefore, $Q_t = (A_t + B_t)/2$. Also, let P_t be the transaction price at the time *t* and let $z_t = P_t - Q_t$, representing one-half of the signed spread that takes on a positive value for a sell order and a negative value for a buy order. The effective or the realized bid-ask spread equals the quoted bid-ask spread for the trades executed at the quoted spread and is smaller (larger) than the quoted for trades executed inside (outside) the spread. For simplicity, the model assumes that all trades are carried out at the quoted spread.

The adverse selection component of the spread relates to the revisions made by the specialist to compensate him for the losses suffered in the course of trading with the informed traders. Let $B_{t+1} = B_t + \lambda z_t$ and $A_{t+1} = A_t + \lambda z_t$, where, λ represents the quote revisions due to adverse information revealed in the market at time *t*. Similarly, let $Q_{t+1} = Q_t + \lambda z_t$ so that, λ, which is an estimate of the adverse selection component of the spread, can be estimated using the following regression model (Lin, Sanger and Booth [1995]):

$$ln(Q_{t+1}) - ln(Q_t) = \lambda(z_t) + e_{t+1} \qquad (2)$$

$$Where,\ z_t = ln(P_t) - ln(Q_t)$$

$$\lambda = Adverse\ Selection\ Component\ (AS)$$

Taking logarithmic values generates the adverse selection component as a percentage of the effective spread, which facilitates comparability and reduces the problem of price discreteness (Lin, Sanger and Booth 1995). First, I run quarterly regressions using the pooled intraday transactions data for each firm for each quarter of the year and obtain the estimated adverse selection component for each quarter. Next, I average the quarterly estimates of the adverse selection component over all the four quarters of each year to obtain the annual adverse selection component (AS_{it}) for firm *i* for year *t*.

5.3 Hypothesis Testing

5.3.1 Test of Hypothesis 1 - General Non-Event Trading I test H1 by carrying out yearly regressions of the annual values of spreads on the total and abnormal accruals along with a set of control variables in the following cross-sectional time-series regression:[17]

$$ln(BID\_ASK_{it}) = \alpha_1 + \alpha_2(ln|\ TOT\_ACC_{it}\ |) + \alpha_3(ln(VOL_{it})) + \alpha_4(ln(SIZE_{it-1})) + \alpha_5(ln(AFOL_{it})) + \alpha_6(ln\ (DISP_{it})) + \alpha_7(ln\ (PIH_{it})) + \alpha_8(ln(STDRET_{it})) + \varepsilon_{it} \qquad (3)$$

[17] I take logarithmic values of all variables to account for potential non-linearity in the relationships as documented in previous studies (Cowan et al. 1992, Dechow 1996, Van Ness et al. 2001, Affleck-Graves et al. 2002).

$$ln(BID\_ASK_{it}) = \alpha_1 + \alpha_2(ln|AB\_ACC_{it}|) + \alpha_3(ln(VOL_{it})) + \alpha_4(ln(SIZE_{it-1})) + \alpha_5(ln(AFOL_{it})) + \alpha_6(ln(DISP_{it})) + \alpha_7(ln(PIH_{it})) + \alpha_8(ln(STDRET_{it})) + \varepsilon_{it} \quad (4)$$

$$ln(ADV\_SEL_{it}) = \alpha_1 + \alpha_2(ln|TOT\_ACC_{it}|) + \alpha_3(ln(VOL_{it})) + \alpha_4(ln(SIZE_{it-1})) + \alpha_5(ln(AFOL_{it})) + \alpha_6(ln(DISP_{it})) + \alpha_7(ln(PIH_{it})) + \alpha_8(ln(STDRET_{it})) + \varepsilon_{it} \quad (5)$$

$$ln(ADV\_SEL_{it}) = \alpha_1 + \alpha_2(ln|AB\_ACC_{it}|) + \alpha_3(ln(VOL_{it})) + \alpha_4(ln(SIZE_{it-1})) + \alpha_5(ln(AFOL_{it})) + \alpha_6(ln(DISP_{it})) + \alpha_7(ln(PIH_{it})) + \alpha_8(ln(STDRET_{it})) + \varepsilon_{it} \quad (6)$$

Where,

BID_ASK_{it} = Annual average daily bid-ask spread for firm i for year t;[18]
ADV_SEL_{it} = Annual adverse selection component of firm i for year t using the Lin, Sanger and Booth (1995) Model;
TOT_ACC_{it} = Earnings before extraordinary items and discontinued operations less operating cash flow (from continuing operations) for firm i for year t;
AB_ACC_{it} = Abnormal accruals obtained using the Jones (1991) model adjusted for growth and performance firm i for year t;
VOL_{it} = Average daily number of outstanding shares of firm i traded over year t;[19]
$SIZE_{it-1}$ = Annual market capitalization of firm i at the beginning of year t;[20]
$DISP_{it}$ = Average standard deviation across analysts' forecasts divided by the absolute value of mean EPS forecast for firm i for year t;[21]
$AFOL_{it}$ = Number of analysts following firm i for year t;
PIH_{it} = Percentage of institutional holding for firm i for year t;
$STDRET_{it}$ = Standard deviation of daily stock returns for firm i for year t.

Based on Hypothesis 1, I predict $\alpha_2 > 0$.

I first estimate the aforesaid regression models by pooling the annual firm-specific measures for all the years of the sample period**.** Since I am pooling time-series cross-sectional data, I estimate the regression equations using a two-way fixed-effects panel model to control for any parameter inconstancies across firms or across time.

[18] Bid-ask spread is measured using the difference between the ask and bid price at the closing of each trading day scaled by the quote mid-point.
[19] As a sensitivity check, I also calculate volume by taking the natural log of total number of shares traded and total value of shares trades.
[20] (Compustat data item # 25) * (Compustat data item # 199).
[21] In order to avoid the usage of stale forecasts, I use the I/B/E/S detail files instead of the summary files to obtain the analyst forecasts. Also, I only use the forecasts that were issued 90 days prior to the end of the fiscal year-end.

I control for the following variables in the regression:

Volume (VOL_{it}): Several studies document a positive relation between information asymmetry and illiquidity (Amihud and Mendelson 1986, 1989). Leuz and Verrecchia (2000) argue that volume is a measure of liquidity, since it reflects an inclination on the part of one investor to buy shares accompanied by an inclination on the part of another to sell those shares. They argue that this inclination should increase with the availability of information for that stock in the market.[22] This argument implies that increased liquidity evidenced in high levels of volume should be characterized by lower information asymmetries. I predict the sign of α_3 to be negative.

Firm Size ($SIZE_{it}$): Hasbrouck (1991) finds that trades of smaller firms carry more information than large firms implying that information asymmetry is higher for smaller firms. Larger firms generally have greater media coverage and higher analyst following. Hence, large-sized firms are associated with a more information-rich environment, which should result in lower information asymmetries among investors. I predict the sign of *SIZE* to be negative.

Analyst Following ($AFOL_{it}$): Empirical evidence documented by certain studies indicates that analysts do not incorporate the effects of abnormal accruals in their forecasts (Abarbanell and Lehavy 2003,[23] Teoh and Wong 1998 and Ahmed et al. 2001). However, Easley and O'Hara (1998) find that the adverse selection component is lower for firms

[22] However, Leuz and Verrecchia (2000) and Leuz (2002) also argue that since volume is also affected by various other factors unrelated to information (for example, portfolio rebalancing, liquidity shocks and changes in risk preferences), it may not truly reflect information asymmetry in the market.

[23] Abarbanell and Lehavy (2003) show that large negative abnormal accruals are associated with large optimistic forecast errors. They also find a higher incidence of small positive forecast errors relative to small negative forecast errors in cross-sectional distributions. They also find that this 'middle asymmetry' goes away when the unexpected accruals are removed from the observation. Their findings indicate a strong connection between analyst forecast errors and abnormal accruals.

having high analyst following. Brennan and Subrahmanyam (1995) find that the adverse selection component and analyst following are inversely related for NYSE stocks. They conclude that high analyst following generates more information in the market resulting in reduced information asymmetry among investors. Therefore, based on the empirical findings of these studies I posit a negative association between analyst following and spreads and predict the sign of the coefficient of AFOL to be negative.

Dispersion ($DISP_{it}$): Several studies in the past have used dispersion in analyst forecast as a proxy for differing beliefs among investors and hence a proxy for information asymmetry in the market (Ajinkya et al. 1991, Atiase and Bamber 1994 and Barron 1995). Since, high dispersion should be associated with relatively high information asymmetry, I control for dispersion among analyst forecasts and predict the sign of its coefficient to be positive.

Percentage of Institutional Holding (PIH_{it}): Lev (1988) suggests that institutional investors possess superior knowledge because the marginal cost of gathering information is relatively lower for institutional investors. Utama and Cready (1997) propose that institutional investors, on average, are better informed than individual investors. They use the percentage of institutional investors as a hypothesized determinant of variation in precision of information among investors in their study. These studies suggest that the presence of institutions is likely to increase information asymmetries in the market. Van Ness et al. (2001) find the percentage of institutional holdings to be positively related to the adverse selection component. Hence, I include PIH (Percentage of Institutional Holding) in the regression and predict the sign of its coefficient to be positive.

Volatility ($STDRET_{it}$): Prior literature has documented a positive association between the bid-ask spread and uncertainty in stock price or the variance in returns (Ho and Stoll 1981, Copeland and Galai 1983 and Morse and Ushman 1983). Morse and Ushman (1983) argue that a risk-averse specialist may widen the spread to cover any losses resulting from increased volatility in stock prices. Hence, I include STDRET in the regression and predict its sign to be positive.

5.3.2 Test of Hypothesis 2- Around Earnings Announcements and 10-Q/K Filing Dates

Kim and Verrecchia (1994, p. 44) argue that "earnings announcements prompt market makers to increase the bid-ask spread during a brief window (perhaps one or two days) surrounding their release. This protects market makers against the temporary information advantage held by processors of public information." H2 tests whether the increase in the spreads around the initial release of accrual information is higher for firms with high absolute magnitudes of total and abnormal accruals. I test this hypothesis both around quarterly and annual earnings announcements as well as around the release of 10-Q and 10K reports. Since all firms do not disclose the full set of financial statements along with the earnings announcement, uncertainty remains over whether the information on accruals is first disclosed on the earnings announcement date or during the release of 10-Q/K. Therefore, I run separate analyses for the earnings announcements dates and the 10-Q/K filing dates. I use a five-day window [-1,+4] around both events. Though this approach has the virtues of potentially strong statistical power (large n) and cost savings (avoids the need to obtain and read each earnings announcement to identify whether or not accrual information is released), it is limited because the event will be mis-specified for a subset of firms in each test. Since accrual information is first released during earnings

announcements only for a sub-set of firms, the tests might fail to detect the hypothesized widening of the spread, thereby resulting in a Type II error. Therefore, I structure a second set of tests ("reduced sample test") after I have reviewed the earnings announcements and determined whether they contain the accrual information. The reduced sample tests will be based on a sample of 1,000 firms. A sample of n=1000, while admittedly arbitrary, should be of sufficient size to provide acceptable power without making the data collection unmanageable. The "event" for the reduced sample test will be defined as the earlier of the earnings or 10-Q/K filing date, whichever first contains the accrual information.

To test H2, first I estimate the abnormal spreads for each announcement window as the difference between the actual average daily spread during the announcement window and the annual average spread as described in Section 5.2.

I first estimate the following regression model by pooling the quarterly firm-specific measures for all the years of the sample period and estimating a two-way fixed effects panel model. Next, I run this regression for each quarter of the sample period to control for serial dependence in the variables.

$$Ln(AB\_BID\_ASK_{it}) = \alpha_1 + \alpha_2(ln|TOT\_ACC_{it}|) + \alpha_3(ln(ABVOL_{it})) + a_4(ln|UE_{it}|) + \alpha_5(ln(SIZE_{it-1})) + a_6(ln|LAG_{it}|) + \varepsilon_{it} \quad (7)$$

$$ln(AB\_ADV\_SEL_{it}) = \alpha_1 + \alpha_2(ln|AB\_ACC_{it}|) + \alpha_3(ln(ABVOL_{it})) + a_4(ln|UE_{it}|) + \alpha_5(ln(SIZE_{it-1})) + a_6(ln|LAG_{it}|) + \varepsilon_{it} \quad (8)$$

$$ln(AB\_BID\_ASK_{it}) = \alpha_1 + \alpha_2(ln|TOT\_ACC_{it}|) + \alpha_3(ln(ABVOL_{it})) + a_4(ln|UE_{it}|) + \alpha_5(ln(SIZE_{it-1})) + a_6(ln|LAG_{it}|) + \varepsilon_{it} \quad (9)$$

$$ln(AB\_ADV\_SEL_{it}) = \alpha_1 + \alpha_2(ln|AB\_ACC_{it}|) + \alpha_3(ln(ABVOL_{it})) + a_4(ln|UE_{it}|) + \alpha_5(ln(SIZE_{it-1})) + a_6(ln|LAG_{it}|) + \varepsilon_{it} \quad (10)$$

Where,

$AB\_BID\_ASK_{i\,t}$ = Natural log of average daily bid-ask spread during the earnings announcement (10-Q/K) window less the natural log of annual

daily bid-ask spread for firm *i* quarter *t*;[24]

$AB\_ADV\_SEL_{i,t}$ = Daily average of the natural log of adverse selection component during the earnings announcement (10-Q/K) window less the daily annual average of the natural log of the adverse selection component of firm *i* for quarter *t* computed using the Lin, Sanger and Booth (1995) model;

$TOT\_ACC_{,it}$ = Earnings before extraordinary items and discontinued operations less operating cash flow (from continuing operations) for firm *i* for quarter *t*;

$AB\_ACC_{,it}$ = Abnormal accruals obtained using the modified Jones (1991) model for firm *i* for quarter *t;*

$ABVOL_{it}$ = The mean adjusted abnormal volume estimated during earnings announcement and 10-Q/K windows for firm *i* for quarter *t*;[25]

UE_{it} = The difference between actual EPS for quarter *t* and the expected EPS scaled by the expected EPS, where the expected EPS is calculated as the mean of the last forecast of every analyst reporting a forecast on IBES for firm *i* for quarter *t*;

$SIZE_{it-1}$ = Market capitalization of firm *i* at the beginning of quarter *t*;

LAG_{it} = Unexpected lag in earnings announcement measured as the difference between the number of days after the fiscal quarter-end the earnings were announced in the current quarter and the previous quarter.

Based on Hypothesis 2, I predict that $\alpha_2 > 0$.

In the event study, since I run the regression models around the first release of accrual information of individual firms and take abnormal spreads as dependent variables in the equations, I automatically control for the firm-specific factors related to the level of spreads. It is not necessary to include a full array of variables taken in equation (3)-(6) to explain the level of spreads. Therefore, I take a rather parsimonious model for the event window study. Consistent with Affleck-Graves et al. (2002), I control for the following variables:

[24] Alternately, estimating the abnormal bid-ask spread as the difference between the daily average of the natural log of total spread less the annual daily average of the natural log of the total spread does not alter the main results of the study in any way.

[25] I calculate abnormal volume as the difference between natural log of percentage of average daily shares traded in the announcement minus the natural log of average daily percentage of shares traded during the year.

Abnormal Volume (ABVOL): I control for abnormal volume (ABVOL) because Lee, Mucklow and Ready (1993) find that the increase in spreads during earnings announcements is significantly positively related to abnormal volume response around earnings announcements. I calculate abnormal volume as the difference between natural log of percentage of average daily shares traded in the announcement minus the natural log of average daily percentage of shares traded during the year. I predict the sign of its coefficient to be positive.

Unexpected Earnings (UE): I control for unexpected earnings (UE) because Affleck-Graves et al. (2002) suggest that the higher the magnitude of the surprise in earnings, the greater the informational advantage of the informed investors to exploit their private information and the higher the adverse selection cost faced by the specialist. I predict the sign of UE to be positive.

Firm Size (SIZE): I control for firms size (SIZE) because firm-size is related to the information environment for firms as bigger firms generally experience larger media coverage and have more public information available to investors than smaller firms. Greater public information should lower the informational advantage of informed investors. I predict the sign of α_5 to be negative.

Lag (LAG): Consistent with Affleck-Graves et al. (2002), I also control for the difference in the number of days the earnings are announced in the current quarter and the previous quarter (LAG). The greater the lag in the current quarter as compared to the previous quarter, the greater the opportunity for the informed investors to exploit their pre-disclosure private information (Kim and Verrecchia 1991) and impose adverse selection costs on the specialist. Therefore, I predict the sign of α_6 to be positive.

6. EMPIRICAL RESULTS

6.1 Yearly Analysis

Table 8A presents the Pearson correlation coefficients among the variables used in the annual study and their respective p-values. As predicted, the adverse selection component is significantly positively related to both total accruals (coefficient = .06023, p-value<.0001) and abnormal accruals (coefficient = 0.04101, p-value = 0.0026). Quite unexpectedly, the bid-ask spread and the adverse selection component are negatively and significantly correlated. This is unusual, but not impossible and is possibly attributable to the negative association between the other components of the spread and the adverse selection component. Krinsky and Lee (1996) documented that while the adverse selection component of the total spread increases during earnings announcements, the other two components of the total spread, namely, the order processing cost and the inventory holding costs decline during the same period. An alternative explanation to this correlation may lie in the overall decline in the total spreads resulting from the reduction in tick size introduced in 1997. Weston (2000) documents that the post-reform decline in the spreads of NASDAQ firms cannot be attributed to the changes in the adverse selection or the inventory holding components of the spread.

Volume is significantly negatively related to both total and abnormal accruals (coefficient = -0.05141 (p-value =0.0002), -0.03197 (p-value = 0.0191)). Both total and abnormal accruals have a negative, though insignificant correlation with SIZE. It appears that high accruals are smaller in size and enjoy less liquidity in the market. These results are consistent with the results of Richardson (2003) and Lev and Nissim (2004) who show

Table 8A - Pearson Correlation Coefficients -Yearly Data

This table presents Pearson's correlation coefficients for the log-transformed values of the variables employed in the annual data of 5,377 observations. The p-values, representing the probability that the coefficients are different from zero, are reported in the parenthesis.

	LN(BID_ASK)	LN(ADV_SEL)	LN|TOT_ACC|	LN|AB_ACC|	LN(VOL)	LN(SIZE)	LN(AFOL)	LN(DISP)	LN(PIH)	LN(STDRET)
LN(BID_ASK)	1									
LN(ADV_SEL)	-0.18553 (<.0001)	1								
LN|TOT_ACC|	-0.02573 (0.0592)	0.06023 (<.0001)	1							
LN|AB_ACC|	-0.03287 (0.0159)	0.04101 (0.0026)	0.69296 (<.0001)	1						
LN(VOL)	-0.22712 (<.0001)	-0.32942 (<.0001)	-0.05141 (0.0002)	-0.03197 (0.0191)	1					
LN(SIZE)	-0.21746 (<.0001)	-0.2516 (<.0001)	-0.00611 (0.6544)	-0.00009 (0.9946)	0.74097 (<.0001)	1				
LN(AFOL)	-0.31121 (<.0001)	-0.34908 (<.0001)	-0.1054 (<.0001)	-0.041 -0.0026	0.58895 (<.0001)	0.51237 (<.0001)	1			
LN(DISP)	0.18775 (<.0001)	-0.06767 (<.0001)	-0.12001 (<.0001)	-0.08488 (<.0001)	0.01806 (0.1854)	-0.04667 (0.0006)	0.0098 -0.4723	1		
LN(PIH)	-0.25995 (<.0001)	0.03593 -0.0084	-0.00073 -0.9576	0.00789 -0.5628	0.08378 (<.0001)	-0.00481 -0.7244	-0.05332 (<.0001)	0.18928 (<.0001)	1	
LN(STDRET)	0.24774 (<.0001)	-0.03793 (0.0054)	-0.02469 (0.0703)	-0.04651 (0.0006)	0.19415 (<.0001)	-0.05517 (<.0001)	0.18026 (<.0001)	-0.02684 (0.0491)	0.04508 (0.0009)	1

show that high accrual firms are mostly small in size having lower volume and book-to-market ratios. The correlation between volume and the spreads is also negative and significant correlation (coefficient = -0.22712 (p-value < .0001), -0.32942 (p-value<.0001)), consistent with the notion that firms with high levels of liquidity enjoy lower transaction costs. Analyst following has a negative and significant correlation with the spreads (coefficient = -0.31121 (p-value<.0001), -0.34908 (p-value<.0001)) indicating that high analyst following generates greater information for firms and thereby, helps mitigate the information asymmetry in the market leading to reduced transaction costs. The correlation between analyst following and total (abnormal) accruals is also negative and significant consistent with the argument that high accrual firms being having small size and low volume experience a relatively lower analyst following and media coverage.

As expected, the correlation between dispersion and bid-ask spread is positive and significant (coefficient = 0.18775, p-value<.0001) which implies that information asymmetry among analysts, as indicated by dispersion in their forecasts, is positively related to the information asymmetry among investors. In line with the results of prior research (Copeland and Galai 1983 and Morse and Ushman 1983), stock return volatility (STDRET) is positively correlated with the total spread having a coefficient of 0.24774 (p-value<.0001), implying that firms with greater uncertainty with regard to price, experience greater information asymmetry in the market. The correlation between percentage of institutional holding and the total spread is negative and significant, indicating that institutional investors prefer to target stocks with lower transaction costs (coefficient = -0.25995, p-value <.0001). Furthermore, it is interesting to note that volume and size have

the strongest significantly positive correlation among all the variables with a correlation coefficient of .74097 (p-value<.0001). Extant literature documents that large size firms are characterized by greater liquidity in the market.

Table 8B reports the Pearson correlation coefficients among the variables used in the quarterly event study around earnings announcements and their respective p-values. As before, the abnormal adverse selection component of the spread is negatively (though insignificantly) correlated to the abnormal total spread (coefficient = -0.0099, p-value = 0.2161). The total accruals are negatively but insignificantly related to the abnormal spreads (coefficient = -0.0002, -0.0023; p-value = 0.9851, 0.7752). The coefficient of correlation between total and abnormal accruals is 0.2871 (p-value = <.0001). Abnormal volume has a negative and significant correlation with abnormal total spread and its adverse selection component (coefficient = -0.1664, -0.0957; p-value = <.0001). The correlation between abnormal volume and total (abnormal) accruals is 0.0266, p-value = 0.0008 (0.0232, p-value = 0.0037). An explanation of this correlation may lie in the increased level of information asymmetry around earnings announcements for high accrual firms that stimulates a high volume reaction (Bamber 1987). While the correlation between SIZE and abnormal volume is negative and significant (-0.3435, p-value = <.0001), UE (unexpected earnings) and abnormal volume are significantly positively correlated (0.0557, p-value=<.0001). This result is consistent with the findings of Bamber (1987) who shows that abnormal volume during earnings announcements is positively related to the level of surprise in earnings but inversely related to firm size. UE (unexpected earnings) has a positive and significant correlation with both total and

Table 8B– Pearson Correlation Coefficients for the Quarterly Event Study Around Earnings Announcements (N = 15,729)

This table presents Pearson's correlation coefficients for the variables of interest for the quarterly event study around earnings announcements. The p-values, representing the probability that the coefficients are different from zero, are reported in the parentheses.

	LN(AB_BID_ASK)	LN(AB_ADV_SEL)	LN|TOT_ACC|	LN|AB_ACC|	LN(ABVOL)	LN(SIZE)	LN|UE|	LN|LAG|
LN(AB_BID_ASK)	1							
LN(AB_ADV_SEL)	-0.0099 (0.2161)	1						
LN|TOT_ACC|	-0.0002 (0.9851)	-0.0023 (0.7752)	1					
LN|AB_ACC|	-0.0361 (<.0001)	-0.0020 (0.8071)	0.2871 (<.0001)	1				
LN(ABVOL)	-0.1664 (<.0001)	-0.0957 (<.0001)	0.0266 (0.0008)	0.0232 (0.0037)	1			
LN(SIZE)	0.2034 (<.0001)	0.1526 (<.0001)	0.0032 (0.6928)	-0.0564 (<.0001)	-0.3435 (<.0001)	1		
LN|UE|	-0.0385 (<.0001)	-0.0168 (0.0354)	0.0191 (0.0169)	0.0072 (0.3656)	0.0557 (<.0001)	-0.1891 (<.0001)	1	
LN|LAG|	-0.0248 (0.0019)	-0.0051 (0.5199)	0.2799 (<.0001)	0.1021 (<.0001)	0.0391 (<.0001)	-0.0075 (0.3482)	-0.0175 (0.0286)	1

Table 8C – Pearson Correlation Coefficients for the Quarterly Event Study Around 10Q/10K Dates (N = 12,327)

This table presents Pearson's correlation coefficients for the variables of interest for the quarterly event study around 10Q/10K dates. The p-values, representing the probability that the coefficients are different from zero, are reported in the parentheses.

	LN(AB_ADV_SEL)	LN(AB_BID_ASK)	LN|TOT_ACC|	LN|AB_ACC|	ABVOL	LN(SIZE)	LN|UE|	LN|LAG|
LN(AB_ADV_SEL)	1							
LN(AB_BID_ASK)	-0.0550 (<.0001)	1						
LN|TOT_ACC|	-0.0005 (0.9526)	-0.0305 (0.0007)	1					
LN|AB_ACC|	-0.0137 (0.1284)	-0.0367 (<.0001)	0.2953 (<.0001)	1				
LN(ABVOL)	-0.0475 (<.0001)	-0.2403 (<.0001)	0.0117 (0.1943)	0.0200 (0.0262)	1			
LN(SIZE)	0.1525 (<.0001)	0.1787 (<.0001)	0.0088 (0.3281)	-0.0425 (<.0001)	-0.2364 (<.0001)	1		
LN|UE|	-0.0134 (0.1373)	-0.0231 (0.0105)	0.0134 (0.1374)	0.0011 (0.9035)	0.0518 (<.0001)	-0.1861 (<.0001)	1	
LN|LAG|	-0.0197 (0.0287)	-0.0235 (0.0092)	0.0061 (0.4971)	0.0071 (0.4282)	0.0112 (0.2126)	-0.0808 (<.0001)	0.0350 (<0.0001)	1

abnormal accruals (coefficient = 0.0191, 0.0072, p-value = 0.0169, 0.3656) consistent with the results of Abarbanell and Lehavy (2003) who find that a considerable portion of the errors in analyst forecast are attributable to the magnitude of abnormal accruals. The variable LAG is significantly positively related to both total and abnormal accruals (coefficient = 0.2799, 0.1021; p-value = <.0001), suggesting that firms with larger magnitude of accruals experience a longer delay the earnings announcements as compared to the previous quarter.[26]

Table 8C reports the Pearson correlation coefficients among the variables used in the quarterly event study around 10-Q/K filing dates and their respective p-values. Almost all the correlations have the same signs though for some correlations the reported significance levels are lower than those reported in the previous table.

Table 9 reports the results of regression Models 3 through 6 estimated to determine the effect of accruals on spreads in the yearly analysis. The coefficient estimates along with the t-statistics are depicted for each model against the independent variables. The coefficient estimates of both abnormal and total accruals in Models 5 and 6 are positive and significant, indicating that the adverse selection component of the spread is increasing in the magnitude of both total and abnormal accruals. This result provides empirical evidence to support the hypothesis that accruals exacerbate information asymmetry in the market and aggravate the adverse selection component of the spread. The association between abnormal accruals and the total spread is positive, though not significant. However, contrary to the main hypothesis of the study, the coefficient total accruals in

[26] Unexpected lag (LAG) in earnings announcement measured as the difference between the number of days after the fiscal quarter-end the earnings were announced in the current quarter and the previous quarter.

Table 9 - Regression Results for the Annual Data

This table reports the coefficient estimates and their respective t-statistic using a one-way fixed effects regression model controlling for yearly effects for the annual data of 5,377 firm-year observations for the sample period 1995-2002.

	Dependent Variable = ln(BID_ASK)						Dependent Variable = ln(ADV_SEL)					
	Model 3			Model 4			Model 5			Model 6		
Variable	**Coeff.**	**t-statistic**		**Coeff.**	**t-statistic**		**Coeff.**	**t-statistic**		**Coeff.**	**t-statistic**	
Intercept	-0.885	-2.76	***	-0.809	-2.50	***	1.059	18.81	***	1.068	18.83	***
|TOT_ACC| (+)	-0.046	-3.16					0.005	2.13	**			
|AB_ACC| (+)				0.001	0.06					0.006	2.31	***
VOL(-)	-0.075	-2.99	***	-0.076	-3.00	***	-0.056	-12.66	***	-0.057	-12.8	***
SIZE(-)	-0.277	-12.26	***	-0.278	-12.20	***	0.030	7.56		0.031	7.77	
DISP(+)	0.075	6.04	***	0.071	5.75	***	-0.008	-3.73		-0.008	-3.62	
AFOL(-)	0.056	1.60		0.053	1.52		0.003	0.45		0.004	0.62	
PIH(+)	-0.036	-3.28		-0.033	-3.08		0.008	4.03	***	0.007	3.94	***
STDRET(+)	0.345	6.40	***	0.331	6.11	***	0.062	6.56	***	0.062	6.56	***
	R-Square = 0.5607			R-Square =	0.5579		R-Square = 0.0629			R-Square =	0.0534	
	F statistic = 223.75			F statistic =	220.58		F statistic = 47.93			F statistic =	47.68	
	(p < .0001)				(p < .0001)			(p < .0001)			(p < .0001)	

Note: *,** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
The four regression models and the variables are defined in Table 4.

Model 3 is negative indicating a negative association between total accruals and the spread. One interpretation of these results is that the other two components of the spread, namely, the order processing cost and the inventory holding cost move in a direction opposite to the adverse selection component and subdue the information asymmetry effect of accruals on the total spread. Krinsky and Lee (1996) document that while the adverse selection component of the spread is found to increase during earnings announcement, the other two components of the spread, namely, the order processing cost and the inventory holding cost, decline during the same period. Future research should look into the impact of accruals on spreads after controlling for the other two components of the spread.

An alternative explanation to the results in the study may lie in the overall decline in the total spreads resulting from the reduction in tick size introduced in 1997. Goldstein and Kavajecz (2000) document that spreads have declined by a total of 14.3% after NYSE passed a rule to bring down the minimum variation in the spreads from $1/8^{th}$ to $1/16^{th}$ of a dollar per share. It is plausible that the decline in the total spread dominates the positive impact of accruals on the adverse selection component of the spread. Weston (2000) documents that the post-reform decline in the spreads of NASDAQ firms cannot be attributed to the changes in the adverse selection or the inventory holding components of the spread.

Most variables in the models have signs in the predicted directions. Consistent with the argument that stocks that are highly liquid have lower transaction costs, volume (VOL) has a negative and significant association with the total spread and its adverse selection component in all four equations. The volatility in stock returns (STDRET) is also positive

and significant for all four equations, depicting that stocks with greater uncertainty with regard to their price movements are characterized by larger spreads. Morse and Ushman (1983) argue that a risk-averse specialist may widen the spread to cover any losses resulting from increased volatility in stock prices. As expected, the variable size (SIZE) is also inversely related to the total spread, consistent with the notion that larger firms have smaller bid-ask spreads. Interestingly, if I remove volume from adverse selection component equations, the variable size become negative and significant. This result is most likely attributed to the strong positive correlation between volume and size (correlation coefficient=.74097, p-value<.0001) depicted in Table 8 due to which one variable tends to subsume the effect of the other.[27]

As predicted, the percentage of institutional holding is positively and significantly associated with adverse selection component (coefficient = 0.008, 0.007, p-value<.001). This result consistent with the notion that the higher the percentage of institutional holding the greater will be the level of informed-trading thereby exacerbating information asymmetry in the market and resulting in wider spreads. The coefficient of dispersion (DISP) is 0.075 and 0.071 (significant at 1%) in Models 3 and 4, consistent with the theory that the higher the disagreement among analyst forecasts the greater will be the level of information asymmetry in the market leading to wider spreads.

Since Sloan (1996) depicts that forming hedge-portfolios by going long (short) on the highest (lowest) decile of signed accruals results in future abnormal returns, it is

[27] A test for the presence of multicollinearity indicated a fairly high degree of multicollinearity between volume and size. However, it does not seem to affect the main results of the study. Even when I remove any one of these variables, I still get the same coefficient signs and similar significance levels for total accruals (TOT_ACC) and abnormal accruals (AB_ACC).

possible that much of the mispricing and hence, the information asymmetry resulting from accruals relates to the highest decile of absolute magnitude of total and abnormal accruals. Table 10 reports the regression results for the annual data after replacing the total and abnormal accruals with dummy variables D_ACC (D_ABACC) that take the value of 1 if the absolute magnitude of total (abnormal) accruals falls in the top most decile of total (abnormal) accruals. The coefficients of the variables D_ACC and D_ABACC are 0.020 (t-stat = 2.49) and 0.016 (t-stat = 1.96), significant at 5% and 1% respectively in Models 5 and 6, indicating that firms having accruals in the top most decile have significantly higher adverse selection component of the spread as compared to other firms. The coefficient of D_ABACC is positive though not significant, indicating that firms having abnormal accruals in the top most decile may have higher bid-ask spread as compared to other firms. However, the coefficient of D_ACC in Model 3 is negative indicating high magnitudes of total accruals are characterized by smaller spreads.

Since the adverse selection component (ADV_SEL) of the spread represents the percentage of the spread that is attributable to its adverse selection cost, it would be interesting to extract that proportion of the total spread and test its relation with the accruals.[28] Table 11 reports the regression results obtained by employing that proportion of the spread that is related to its adverse selection component as the dependent variable estimated as total bid-ask spread multiplied by the percentage of the adverse selection component (BID_ASK *ADV_SEL). The coefficient of abnormal accruals in this model is

[28] For example, if total spread is .05 (i.e., 5% of the quote mid-point, and adverse selection component is 0.56 or 56% of the total spread, the value of the variable BID_ASK * ADV_SEL would be .05*.56 = .028, representing that proportion of the total spread that is attributable to the adverse selection cost of the spread.

Table 10 –Regression Results for the Annual Data using Dummy Variables for the Top Decile Accrual Firms

This table reports the results of the regression results after taking dummy variable D_ACC (D_ABACC) that takes the value of 1 for firms whose absolute magnitude of total (abnormal) accruals fall in the top decile of the 5,377 observations used in the annual analysis.

	Dependent Variable = ln(BID_ASK)						Dependent Variable = ln(ADV_SEL)					
	Model 3			Model 4			Model 5			Model 6		
	Coeff.	t-stat		Coeff.	t-stat		Coeff.	t-stat		Coeff.	t-stat	
Intercept	-0.363	-1.11		-0.505	-1.54		1.028	18.16	***	1.038	18.43	***
D_ACC(+)	-0.119	-2.59					0.020	2.49	***			
D_ABACC(+)				0.036	0.76					0.016	1.96	**
VOL(-)	-0.088	-3.42	***	-0.088	-3.42	***	-0.056	-12.60	***	-0.057	-12.75	***
SIZE(-)	-0.264	-11.46	***	-0.265	-11.49	***	0.030	7.46		0.031	7.75	
DISP(+)	0.073	5.77	***	0.069	5.46	***	-0.008	-3.63		-0.008	-3.55	
AFOL(-)	0.046	1.29		0.045	1.26		0.002	0.41		0.004	0.58	
PIH(+)	-0.039	-3.56		-0.038	-3.38		0.008	4.04	***	0.008	4.01	***
STDRET(+)	0.405	7.39	***	0.392	7.11	***	0.062	6.60	***	0.062	6.51	***
	R-Square = 0.5603			R-Square = 0.5581			R-Square = 0.2142			R-Square = 0.2127		
	F Statistic = 223.38			F Statistic = 221.41			F Statistic = 47.78			F Statistic = 47.35		
	(p <.0001)			(p <.0001)			(p <.0001)			(p <.0001)		

Note: *,** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
The four regression models and the variables are defined in Table 4.

Table 11 –Regression Results for the Annual Data by Employing that Proportion of the Total Spread that Relates to the Adverse Selection Component of the Spread

This table reports regression results obtained by employing that proportion of the spread that is relates to its adverse selection component as the dependent variable estimated as total spread times the percentage of the adverse selection component (BID_ASK *ADV_SEL) for the 5,377 observations used in the annual analysis.

	Dependent Variable = BID_ASK *ADV_SEL							
	Coeff.	**t-stat**	**p-value**		**Coeff.**	**t-stat**	**p-value**	
Intercept	0.379	1.34	0.091	*	0.502	1.75	0.040	**
|TOT_ACC| (+)	-0.032	-2.42	0.008					
|AB_ACC| (+)					0.017	1.24	0.107	*
VOL(-)	-0.243	-10.93	0.000	***	-0.248	-11.06	0.000	***
SIZE(-)	-0.176	-8.84	0.000	***	-0.174	-8.66	0.000	***
DISP(+)	0.051	4.65	0.000	***	0.048	4.38	0.000	***
AFOL(-)	0.046	1.49	0.069		0.047	1.53	0.064	
PIH(+)	-0.020	-2.05	0.020		-0.018	-1.87	0.031	
STDRET(+)	0.609	12.79	0.000	***	0.593	12.42	0.000	***
	R-Square = 0.6791				R-Square = 0.6779			
	F Statistic = 370.88				F Statistic = 368.96			
	(p <.0001)				(p <.0001)			

Note: *,** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All other variables are as defined in Table 4.

0.017, significant at 10%, indicating that the portion of the spread attributable to the adverse selection problem is increasing in the magnitude of abnormal accruals. However, the coefficient of total accruals is -0.032, implying that the total accruals have a diminishing effect on the adverse selection portion of the spread.

6.2 Quarterly Event Study - Around Earnings Announcements

Table 12 presents the regression results of the association between the abnormal spreads and accruals during a five day window [-1,+3] around the quarterly earnings announcements. Consistent with the annual analysis, the coefficient of total accruals in Model 9 is positive and significant at 10% indicating that the increase in the adverse selection component during earnings announcements has a positive and significant association with the total accruals (coefficient = 0.0011, t-stat = 1.5). The coefficient of abnormal accruals in Model 10 is 0.00 indicating that abnormal accruals do not influence the variation in the abnormal adverse selection component. The coefficients of total and abnormal accruals are negative in Models 7 and 8 that have the bid-ask spread as the dependent variable. Contrary to the main hypothesis of the study, they indicate that any increase in the abnormal bid-ask spread during earnings announcements is negatively associated with the total and abnormal accruals. Since the results document a positive association between the abnormal adverse selection component and the total accruals, it is plausible that this result is camouflaged in the total spread by an opposite movement in the other two components of the spread. As predicted, the coefficient of SIZE is -0.0264, significant at 1%, indicating that the increase in the adverse selection component during earnings announcement is decreasing in the size of the firms. Contrary to the prediction in

Table 12 - Regression Results for the Quarterly Event Study Around Earnings Announcements

This table reports the coefficient estimates and their respective t-statistic for regression of abnormal spreads estimated over a 5-day [-1,+3] window around earnings announcement dates on the absolute values of total and abnormal accruals for the quarterly data of 15,729 firm-quarter observations for the sample period 1995-2002.

	Model 7			**Model 8**			**Model 9**			**Model 10**		
	Dependent Variable = ln(AB_BID_ASK)						**Dependent Variable = ln(AB_ADV_SEL)**					
	Coeff.	**t stat**		**Coeff.**	**t stat**		**Coeff.**	**t stat**		**Coeff.**	**t stat**	
Intercept	-1.4122	-23.41	***	-1.437	-23.81	***	0.2098	13.18	***	0.2056	12.91	***
|TOT_ACC| (+)	-0.0043	-1.47					0.0011	1.50	*			
|AB_ACC| (+)				-0.010	-3.58					0.0000	0.06	
ABVOL(+)	-0.0486	-11.19		-0.048	-11.09		0.0002	0.16		0.0002	0.20	
SIZE(-)	0.2044	25.25		0.204	25.22		-0.0264	-12.38	***	-0.0263	-12.34	***
|UE| (+)	-0.0001	-0.09		0.000	-0.11		-0.0003	-1.04		-0.0003	-1.04	
|LAG| (+)	-0.0029	-3.35		-0.003	-3.37		-0.0004	-1.68		-0.0004	-1.63	
	R-Square=	0.0609		R-Square=	0.0616		R-Square=	0.0112		R-Square=	0.0112	
	F statistic=	188.33		F statistic=	190.6		F statistic=	190.6		F statistic=	190.6	
	(p	<.0001)		(p	<.0001)		(p	<.0001)		(p	<.0001)	

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All models and variables are as defined in Table 5.

the study, the coefficient of ABVOL is negative (coefficient = 0.0486, 0.048) in Models 7 and 8, indicating an inverse relation between abnormal volume and the abnormal bid-ask spread during the quarterly earnings announcements. One plausible explanation of this result is that a high magnitude of trading during the event window results in lowering the transaction costs. The coefficient of LAG is also unexpectedly negative in all the four equations. The explanation of this negative coefficient may lie in the conjecture that a delay in the earnings announcements lends time to the investors to mitigate some of the pre-disclosure information asymmetry that results in lowering the spreads.

6.3 Quarterly Event Study - Around 10-Q/10-K Filing Dates

Table 13 reports the regression results of the association between abnormal spreads and the accruals during the release of 10-Q/K over a [-1, +3] window.[29] The results are very similar to those obtained for the event study around earnings announcements. The coefficient of total accruals is 0.002, significant at 5%, indicating that the increase in the adverse selection component during the release of 10-Q/K filings is positively and significantly related to the absolute magnitude of total accruals. Once again, the coefficient of total (abnormal) accruals is negative for Model 7 and 8 indicating a negative association between abnormal bid-ask spread and accruals. As predicted, the coefficient of abnormal volume (ABVOL) is 0.004 in Model 9 and 10 and is significant at 1%. Consistent with the argument of Kim and Verrecchia (KV 1994), higher the asymmetry associated with the release of any information, the higher is the volume and the wider are the spreads. Wider spread "protects market makers against the temporary information

[29] I obtained the 10-Q/K filing dates from the SEC website: ftp://sec.gov/edgar/full-index

Table 13 - Regression Results for the Quarterly Event Study Around 10Q/K Filing Dates

This table reports the coefficient estimates and their respective t-statistic for regression of abnormal spreads estimated over a 5-day [-1,+3] window around 10Q/K filing dates on the absolute values of total and abnormal for the quarterly data of 12,327 firm-quarter observations for the sample period 1995-2002.

	Model 7			**Model 8**			**Model 9**			**Model 10**		
	Dependent Variable = ln(AB_BID_ASK)						**Dependent Variable = ln(AB_ADV_SEL)**					
Variable	**Coeff.**	**t statistic**		**Coeff.**	**t statistic**		**Coeff.**	**t statistic**		**Coeff.**	**t statistic**	
Intercept	-0.010	-4.64	***	-0.616	-13.84	***	0.187	10.96	***	0.175	10.28	***
|TOT_ACC| (+)	-0.064	-20.80					0.002	2.24	**			
|AB_ACC| (+)				-0.008	-3.70					-0.001	-1.33	
ABVOL(+)	-0.081	-13.69		-0.064	-20.72		0.004	3.42	***	0.004	3.49	***
SIZE(-)	0.001	1.47		0.080	13.59		-0.024	-10.75	***	-0.024	-10.71	***
|UE| (+)	0.001	1.35	*	0.001	1.50	*	0.000	-0.06		0.000	-0.08	
|LAG| (+)	-0.623	-14.01		-0.001	-1.34		0.000	-1.47		0.000	-1.51	
R-Square =	0.612			R-Square=	0.0605		R-Square=	0.0128		R-Square=	0.0125	
F statistic=	147.85			F statistic=	146.17		F statistic=	29.45		F statistic=	28.8	
(p-value	<.0001)			(p-value	<.0001)		(p-value	<.0001)		(p-value	<.0001)	

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All models and variables are as defined in Table 5.

advantage held by processors of public information" (KV 1994, p.44). The coefficient of SIZE is -10.75 and -10.71 respectively in Model 9 and 10, significant at 1%, suggesting that the size of a firm has a diminishing effect on the information asymmetry and hence the adverse selection component during the 10-Q/K filings. The coefficient of unexpected earnings (UE) in Model 7 and 8 is positive and significant indicating that higher the surprise in earnings the higher the level of information asymmetry as reflected in the abnormal total spread (Affleck Graves et al. 2003).

6.4 Alternate Tests

- Income-Increasing vs. Income-Decreasing Accruals

Beneish and Vargus (2002) show that most of accrual mispricing is attributable to *income-increasing* accruals. They observe a lower persistence in accruals where income-increasing accruals are accompanied by abnormal insider selling and higher persistence in accruals when income-increasing accruals were accompanied by abnormal insider buying. Zhang (2003) finds that short sellers go short with high levels of income-increasing abnormal accruals, especially in the third and fourth quarter of the fiscal year and profit from their overpricing. Hence, I rerun the tests after decomposing accruals into income-increasing accruals and income-decreasing accruals to determine whether the absolute magnitude of income-increasing accruals has a significantly different impact on spreads than the absolute magnitude of income-decreasing accruals.

In Table 14, in Model 7, the difference between the coefficients of income-increasing (positive) and income-decreasing accruals is insignificant. In Model 8, income-decreasing (negative) abnormal accruals significantly greater *downward* impact on total

Table 14 - Income-Increasing vs. Income-Decreasing Accruals – Yearly Analysis

This table reports the coefficient estimates and their respective t-statistic to test whether income-increasing accruals have a significantly higher impact on the spreads than income-decreasing accruals. The variable TOT_POS (AB_POS) takes the value of total (abnormal) accruals if the total (abnormal) accruals are greater than zero and zero otherwise. The variable TOT_NEG (AB_NEG) takes the value of total (abnormal) accruals if the total (abnormal) accruals are less than zero and zero otherwise. If the estimated coefficient of TOT_POS (AB_POS) is significantly greater than TOT_NEG (AB_NEG) it would indicate that the income-increasing (abnormal) accruals have a significantly higher impact on spreads than income-decreasing (abnormal) accruals. The data consists of 5,377 firm-year observations for the sample period 1994-2001.

	Model 7			**Model 8**			**Model 9**			**Model 10**		
	Dependent Variable = ln(BID_ASK)						**Dependent Variable = ln(ADV_SEL)**					
	Coeff.	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**	
Intercept	-0.8878	-2.77	***	-0.8050	-2.48	***	1.0605	18.87	***	1.0689	18.85	***
|TOT_POS| (+)	-0.0420	-2.61					0.0030	1.07				
|TOT_NEG| (+)	-0.0513	-3.15					0.0081	2.84	***			
|AB_POS| (+)				-0.0145	-0.88					0.0049	1.69	**
|AB_NEG| (+)				0.0022	0.13					0.0077	2.66	***
VOL(-)	-0.0742	-2.94	***	-0.0768	-3.02	***	-0.0565	-12.79	***	-0.0570	-12.82	***
SIZE(-)	-0.2780	-12.26	***	-0.2770	-12.17	***	0.0308	7.74		0.0311	7.80	
DISP(+)	0.0740	5.98	***	0.0715	5.79	***	-0.0078	-3.60		-0.0077	-3.59	
AFOL(-)	0.0547	1.58		0.0542	1.55		0.0033	0.54		0.0040	0.65	
PIH(+)	-0.0355	-3.27		-0.0336	-3.09		0.0076	4.00	***	0.0075	3.93	***
STDRET(+)	0.3474	6.43	***	0.3311	6.12	***	0.0610	6.44	***	0.0622	6.57	***
	R-Square = 0.5609 F Statistic = 195.75 (p <.0001)			R-Square = 0.5581 F Statistic = 193.55 (p <.0001)			R-Square = 0.2163 F Statistic = 42.29 (p <.0001)			R-Square = 0.2153 F Statistic = 42.04 (p <.0001)		
Test:	TOT_POS > TOT_NEG F Statistic = 0.47 p-value = 0.4912			AB_POS > AB_NEG F Statistic = 2.48 p-value = 0.05775			TOT_POS > TOT_NEG F Statistic = 4.62 p-value = 0.0159			AB_POS > AB_NEG F Statistic = 2.06 p-value = 0.07595		

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All models and variables are as defined in Table 4.

Table 15 - Income-Increasing vs. Income-Decreasing Accruals - Around Quarterly Earnings Announcements

This table reports the coefficient estimates and their respective t-statistic to test whether income-increasing accruals have a significantly higher impact on the spreads than income-decreasing accruals. The variable TOT_POS (AB_POS) takes the value of total (abnormal) accruals if the total (abnormal) accruals are greater than zero and zero otherwise. The variable TOT_NEG (AB_NEG) takes the value of total (abnormal) accruals if the total (abnormal) accruals are less than zero and zero otherwise. If the estimated coefficient of TOT_POS(AB_POS) is significantly greater than TOT_NEG (AB_NEG) it would indicate that the income-increasing (abnormal) accruals have a significantly higher impact on spreads than income-decreasing (abnormal) accruals. The data consists of 15,729 firm-quarter observations for the sample period 1995-2002.

	Dependent Variable = ln(AB_BID_ASK)						**Dependent Variable = ln(AB_ADV_SEL)**					
	Model 7			**Model 8**			**Model 9**			**Model 10**		
	Coeff.	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**	
Intercept	-1.4981	-20.55	***	-1.5325	-21.68	***	0.2173	11.29	***	0.2055	11.01	***
|TOT_POS| (+)	-0.0093	-2.61					0.0008	0.86				
|TOT_NEG| (+)	-0.0051	-1.75					0.0011	1.41	*			
|AB_POS| (+)				-0.0102	-3.37					-0.0001	-0.13	
|AB_NEG| (+)				-0.0107	-3.58					0.0002	0.19	
ABVOL(+)	-0.0486	-11.20		-0.0482	-11.10		0.0002	0.16		0.0002	0.21	
SIZE(-)	0.2047	25.29		0.2039	25.21		-0.0264	-12.37	***	-0.0263	-12.32	***
|UE| (+)	-0.0001	-0.10		-0.0001	-0.11		-0.0003	-1.04		-0.0003	-1.06	
|LAG| (+)	-0.0029	-3.33		-0.0030	-3.37		-0.0004	-1.67		-0.0004	-1.63	
	R-Square = 0.0473 F Statistic =157.99 (p <.0001)			R-Square = 0.0475 F Statistic =158.84 (p <.0001)			R-Square = 0.0234 F Statistic = 27.43 (p <.0001)			R-Square = 0.0234 F Statistic = 27.07 (p <.0001)		
Test:	TOT_POS > TOT_NEG F Statistic = 5.95 p-value = 0.00735			AB_POS > AB_NEG F Statistic = .11 p-value = 0.37185			TOT_POS > TOT_NEG F Statistic = .38 p-value = 0.2693			AB_POS > AB_NEG F Statistic = .47 p-value = 0.2457		

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All models and variables are as defined in Table 5.

Table 16 - Income-Increasing vs. Income-Decreasing Accruals - Around 10Q/K Filing Dates

This table reports the coefficient estimates and their respective t-statistic to test whether income-increasing accruals have a significantly higher impact on the spreads than income-decreasing accruals. The variable TOT_POS (AB_POS) takes the value of total (abnormal) accruals if the total (abnormal) accruals are greater than zero and zero otherwise. The variable TOT_NEG (AB_NEG) takes the value of total (abnormal) accruals if the total (abnormal) accruals are less than zero and zero otherwise. If the estimated coefficient of TOT_POS (AB_POS) is significantly greater than TOT_NEG (AB_NEG) it would indicate that the income-increasing (abnormal) accruals have a significantly higher impact on spreads than income-decreasing (abnormal) accruals. The data consists of 12,327 firm-quarter observations for the sample period 1995-2002.

	Dependent Variable = ln(AB_BID_ASK)						**Dependent Variable = ln(AB_ADV_SEL)**					
	Model 7			**Model 8**			**Model 9**			**Model 10**		
	Coeff.	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**	
Intercept	-0.7061	-13.13	***	-0.6865	-13.16	***	0.2078	10.09	***	0.1638	8.20	***
|TOT_POS| (+)	-0.0091	-3.44					0.0023	2.27	**			
|TOT_NEG| (+)	-0.0098	-4.55					0.0019	2.31	***			
|AB_POS| (+)				-0.0072	-3.21					-0.0015	-1.70	
|AB_NEG| (+)				-0.0086	-3.89					-0.0008	-0.98	
ABVOL(+)	-0.0637	-20.80		-0.0636	-20.73		0.0040	3.42	***	0.0041	3.51	***
SIZE(-)	0.0810	13.68		0.0803	13.55		-0.0244	-10.76	***	-0.0242	-10.66	***
|UE| (+)	0.0014	1.47	*	0.0014	1.52	*	0.0000	-0.06		0.0000	-0.11	
|LAG| (+)	-0.0009	-1.37		-0.0008	-1.35		-0.0004	-1.50		-0.0004	-1.51	
	R-Square = 0.0619 F Statistic = 123.26 (p <.0001)			R-Square = 0.0618 F Statistic = 122.11 (p <.0001)			R-Square = 0.0231 F Statistic =24.64 (p <.0001)			R-Square = 0.02310 F Statistic =24.11 (p <.0001)		
Test:	TOT_POS > TOT_NEG Fstatistic = 0.35 p-value = 0.27645			AB_POS > AB_NEG Fstatistic = 1.78 p-value = 0.09135			TOT_POS > TOT_NEG Fstatistic = 0.60 p-value = 0.22025			AB_POS > AB_NEG Fstatistic = 2.49 p-value = 0.05735		

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All models and variables are as defined in Table 5.

spreads than income-increasing accruals. The results of Models 9 and 10 indicate that income-increasing accruals have a significantly higher positive impact on spreads than income-decreasing accruals.

In Table 15, in Model 7, income-decreasing abnormal accruals have significantly greater *downward* impact on total spreads than income-increasing accruals during earnings announcements. The difference between the coefficients of income-increasing and income-decreasing accruals is insignificant in the other three models.

In Table 16, in Model 7 and 9 the difference between the estimated coefficients of income-increasing and income decreasing accruals is not significant. While in Model 8 income-decreasing accruals have a significantly greater negative association with total spreads than income-increasing accruals, in Model 10, the negative association between income-increasing accruals and the adverse selection component of the spread is significantly greater than that of income-decreasing accruals. Overall, there appears to be no conclusive evidence on whether income-increasing accruals have a significantly higher association with spreads than income-decreasing accruals.

- Performance-matched Abnormal Accruals *(Kothari et al. (2005))*

I re-run the tests by employing performance-matched abnormal accruals (Kothari et al. 2005) as an alternate measure of abnormal accruals, estimated as the difference between abnormal accruals obtained from the Jones model (Jones et al. 1991) for each year and SIC code and the median abnormal accruals of the ROA decile and two-digit SIC code to which the firm belongs.

Table 17 – Alternate Test – Using Kothari's (2005) Performance-Matched Abnormal Accruals in the Yearly Analysis (N = 5,377)

This table reports the regression results by substituting the abnormal accruals obtained from the modified Jones (1991) model with the performance-matched abnormal accruals (Kothari et al. 2005) estimated as the difference between abnormal accruals obtained from the Jones model (1991) for each year and SIC code and the median abnormal accruals of the ROA and industry decile to which the firm belongs.

	Dependent Variable = ln(BID_ASK)			**Dependent Variable = ln(ADV_SEL)**		
Variable	**Coeff.**	**t statistic**		**Coeff.**	**t statistic**	
Intercept	-0.835	-2.59	***	1.067	18.90	***
|KOTHARI| (+)	-0.009	-1.09		0.004	2.64	***
VOL(-)	-0.075	-2.96	***	-0.057	-12.81	***
SIZE(-)	-0.279	-12.27	***	0.031	-7.79	***
DISP(+)	0.072	5.80	***	-0.008	-3.68	
AFOL(-)	0.054	1.54	*	0.003	0.49	
PIH(+)	-0.034	-3.14		0.008	4.07	***
STDRET(+)	0.330	6.12	***	0.064	6.74	***
	R-Square =	0.5576		R-Square =	0.2149	
	F statistic =	220.91		F statistic =	47.98	
		(p<.0001)			(p<.0001)	

Note: *,** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.

Table 18 –Using Kothari's (2005) Performance-Matched Abnormal Accruals – Around Earnings Announcements (N = 15,729)

This table reports the regression results by substituting the abnormal accrual accruals obtained from the Jones (1991) model with the performance-matched abnormal accruals estimated (Kothari et al. 2005) for each firm estimated as the difference between abnormal accruals obtained from the Jones model (1991) for each year and SIC code and the median abnormal accruals of the ROA and industry decile to which the firm belongs.

	Dependent Variable = ln(AB_BID_ASK)				Dependent Variable = ln(AB_ADV_SEL)		
Variables	**Coeff.**	**t statistic**		**Variables**	**Coeff.**	**t statistic**	
Intercept	-1.4274	-23.90	***	Intercept	0.2062	13.08	***
|KOTHARI| (+)	-0.0065	-4.14		|KOTHARI| (+)	0.0002	0.41	
ABVOL(+)	-0.0484	-11.14		ABVOL(+)	0.0002	0.20	
SIZE(-)	0.2041	25.24		SIZE(-)	-0.0263	-12.34	***
|UE| (+)	-0.0002	-0.13		|UE| (+)	-0.0003	-1.04	
|LAG| (+)	-0.0029	-3.32		|LAG| (+)	-0.0004	-1.64	
	R-Square = 0.0619				R-Square = 0.0110		
	F Statistic = 191.52				F Statistic = 32.42		
	(p <.0001)				(p <.0001)		

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.

Table 19 – Using Kothari's (2005) Performance-Matched Abnormal Accruals – Around 10Q/K Filing (N = 12,327)

This table reports the regression results by substituting the abnormal accruals obtained from the modified Jones (Dechow et al. 1995) model with the performance-matched abnormal accruals (Kothari et al. 2005) estimated as the difference between abnormal accruals obtained from the modified Jones model (1991) for each year and SIC code and the median abnormal accruals of the ROA and industry decile to which the firm belongs.

	Dependent Variable= ln(AB_BID_ASK)				**Dependent Variable= ln(AB_ADV_SEL)**		
Variables	**Coeff.**	**t statistic**		**Variables**	**Coeff.**	**t statistic**	
Intercept	-0.605	-13.71	***	Intercept	0.179	10.60	***
|KOTHARI| (+)	-0.004	-3.47		|KOTHARI|	0.000	-0.25	
ABVOL(+)	-0.064	-20.76		ABVOL	0.004	3.45	***
SIZE(-)	0.081	13.60		SIZE	-0.024	-10.70	***
|UE| (+)	0.001	1.45	*	|UE|	0.000	-0.08	
|LAG| (+)	-0.001	-1.29		|LAG|	0.000	-1.49	
	R-Square=	0.0604			R-Square=	0.0124	
	F statistic=	145.82			F statistic=	28.45	
	(p-value	<.00010			(p-value	<.0001)	

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.

Table 17 reports the results of yearly regression models after re-estimating the abnormal accruals using Kothari's (2005) measure of performance-matched abnormal accruals. The coefficient estimate of Kothari's performance-matched abnormal accruals (KOTHARI) is positive and statistically significant (coefficient: 0.004) at 10% for the adverse selection component equation lending support to the main hypothesis of the study.

Tables 18 and 19 depict the regression results obtained by employing the performance-matched abnormal accruals (Kothari's 2005) model of abnormal accruals in the quarterly event studies. The results obtained by employing Kothari's (2005) performance-matched accruals are qualitatively similar to those obtained from employing abnormal accruals using the Jones (1991) model. The coefficient of KOTHARI is negative both for the bid-ask spread and the adverse selection component models.

- <u>High Accruals Firms with More Desirable Characteristics</u>

Lev and Nissim (2004) document that one explanation why the accrual anomaly still persists and has not been eliminated, at least by the institutional investors, is that firms with extreme accruals possess characteristics that are unappealing to institutional investors. Specifically, Lev and Nissim (2004) find whereas institutional investors tend to prefer bigger size firms having high stock prices and book to market ratios, extreme accruals firms are generally smaller in size and have low stock price and book to market ratios**.** These results suggest that the accrual anomaly should be better exploited among high accrual firms that do not have these characteristics. Therefore, as an additional test, I further partition the high accrual firms based on size, market price and book to market and examine any differences in the association between accruals and spreads across these sub-groups.

Table 20 – High Accrual Firms with High Size, Price and BM Ratio - Yearly Analysis

The following regression models are estimated by using only those firm-year observations whose absolute value of total accruals is greater than the median absolute value of total accruals in the data. This table represents the regression results obtained from taking high accrual firms (i.e., whose absolute value of total accruals is greater than the median value of total accruals) and separating the ones with higher price, size and B/M ratio from the ones with lower price, size and BM ratio for the yearly data of 2,806 firm-year observations. The dummy variable (D_HIGH) takes the value of 1 for firms whose size, B/M and price is greater than the median size, price and B/M of the firm-year observations used in the regression analysis. A significantly positive value of D_HIGH would indicate that the high accrual firms with relatively higher price, B/M ratio and size have a significantly higher spreads than the firms with lower price, B/M ratio. Based on the results of Lev and Nissim (2004) size that may be attributable to a greater exploitation of the accrual anomaly by informed investors among these firms.

	Dependent Variable = ln(BID_ASK)						**Dependent Variable = ln(ADV_SEL)**					
	Model 3			**Model 4**			**Model 5**			**Model 6**		
	Coeff.	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**	
Intercept	-0.250	-0.67		-0.224	-0.59		1.059	17.60	***	1.096	18.23	***
D_HIGH(+)	-0.131	-2.00		-0.142	-2.16		0.024	2.30	***	0.029	2.76	***
|TOT_ACC| (+)	-0.043	-2.47					0.007	2.37	***			
|AB_ACC| (+)				-0.018	-1.12					0.013	5.06	***
VOL(-)	-0.119	-4.1	***	-0.116	-3.96	***	-0.053	-11.20	***	-0.055	-11.78	***
SIZE(-)	-0.232	-8.72	***	-0.238	-8.90	***	0.028	6.56		0.031	7.22	
DISP(+)	0.040	2.78	***	0.041	2.85	***	-0.005	-2.17		-0.005	-2.40	
AFOL (-)	0.070	1.74		0.073	1.80		-0.006	-0.93		-0.006	-0.89	
PIH(+)	-0.027	-2.07		-0.026	-1.99		0.004	1.87	**	0.004	1.83	**
STDRET(+)	0.504	8.04	***	0.484	7.78	***	0.057	5.62	***	0.058	5.89	***
	R-Square = 0.5298			R-Square = 0.5275			R-Square = 0.2232			R-Square = 0.2232		
	F Statistic = 135.78			F Statistic = 134.51			F Statistic = 34.62			F Statistic = 34.62		
	(p <.0001)			(p <.0001)			(p <.0001)			(p <.0001)		

Note: *,** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
The four regression models and the variables are defined in Table 4.

Table 21 – High Accrual Firms with High Size, Price and BM Ratio – Around Earnings Announcements

The following regression models are estimated by using only those firm-quarter observations whose absolute value of total accruals is greater than the median absolute value of total accruals in the data. This table represents the regression results obtained from taking high accrual firms (i.e., whose absolute value of total accruals is greater than the median value of total accruals) and separating the ones with higher price, size and B/M ratio from the ones with lower price, size and BM ratio for the quarterly data of 7,871 firm-quarter observations. The dummy variable (D_HIGH) takes the value of 1 for firms whose size, B/M and price is greater than the median size, price and B/M of the firm-quarter observations used in the regression analysis. A significantly positive value of D_HIGH would indicate that the high accrual firms with relatively higher price, B/M ratio and size have a significantly higher spreads than the firms with lower price, B/M ratio and size. Based on the results of Lev and Nissim (2004), this difference could be attributable to a greater exploitation of the accrual anomaly by informed investors among these firms.

	Dependent Variable = ln(AB_BID_ASK)						**Dependent Variable = ln(AB_ADV_SEL)**					
	Model 7			**Model 8**			**Model 9**			**Model 10**		
	Coeff.	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**		**Coeff.**	**t-stat**	
Intercept	-1.1870	-14.35	***	-1.2041	-14.49	***	0.2171	9.81	***	0.2113	9.51	***
D_HIGH(+)	0.0344	1.50	*	0.0342	0.14		-0.0021	0.01		-0.0020	0.01	
|TOT_ACC| (+)	-0.0036	-0.88					0.0003	0.30				
|AB_ACC| (+)				-0.0077	-1.81					-0.0012	-1.06	
ABVOL(+)	-0.0512	-8.22		-0.0509	-8.16		0.0002	0.14		0.0003	0.19	
SIZE(-)	0.1751	15.44		0.1750	15.44		-0.0281	-9.28	***	-0.0282	-9.30	***
|UE| (+)	-0.0005	-0.28		-0.0006	-0.33		0.0001	0.17		0.0001	0.16	
|LAG| (+)	-0.0039	-3.10		-0.0039	-3.14		-0.0002	-0.45		-0.0001	-0.42	
	R-Square = 0.1019			R-Square = 0.1016			R-Square = 0.0211			R-Square = 0.0211		
	F Statistic = 64.60			F Statistic = 65.04			F Statistic = 15.33			F Statistic = 15.33		
	(p <.0001)			(p <.0001)			(p <.0001)			(p <.0001)		

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All models and variables are as defined in Table 5.

Table 22 – High Accrual Firms with High Size, Price and BM Ratio – Around 10Q/K Filing Dates

The following regression models are estimated by using only those firm-quarter observations whose absolute value of total accruals is greater than the median absolute value of total accruals in the data. This table represents the regression results obtained from taking high accrual firms (i.e., whose absolute value of total accruals is greater than the median value of total accruals) and separating the ones with higher price, size and B/M ratio from the ones with lower price, size and BM ratio for the quarterly data of 7,871 firm-quarter observations. The dummy variable (D_HIGH) takes the value of 1 for firms whose size, B/M and price is greater than the median size, price and B/M of the firm-quarter observations used in the regression analysis. A significantly positive value of D_HIGH would indicate that the high accrual firms with relatively higher price, B/M ratio and size have a significantly higher spreads than the firms with lower price, B/M ratio and size. Based on the results of Lev and Nissim (2004), this difference could be attributable to a greater exploitation of the accrual anomaly by informed investors among these firms.

	Dependent Variable = ln(AB_BID_ASK)						Dependent Variable = ln(AB_ADV_SEL)					
	Model 7			Model 8			Model 9			Model 10		
	Coeff.	t-stat		Coeff.	t-stat		Coeff.	t-stat		Coeff.	t-stat	
Intercept	-0.518	-8.36	***	-0.527	-8.47	***	0.165	6.93	***	0.152	6.32	***
D_HIGH(+)	0.019	1.11		0.018	1.05		0.001	0.14		0.001	0.16	
|TOT_ACC| (+)	-0.004	-1.38					0.002	1.84	**			
|AB_ACC| (+)				-0.006	-1.91					-0.001	-1.18	
ABVOL(+)	-0.065	-14.34		-0.064	-14.26		0.005	2.88	***	0.005	2.93	***
SIZE(-)	0.070	8.39		0.071	8.42		-0.021	-6.57	***	-0.021	-6.59	***
|UE| (+)	0.003	2.02	**	0.003	2.16	**	0.001	1.39	*	0.001	1.41	*
|LAG| (+)	-0.001	-1.15		-0.001	-1.22		0.000	-0.03		0.000	0.02	
	R-Square = 0.0662 F Statistic = 54.28 (p <.0001)			R-Square = 0.0650 F Statistic = 54.59 (p <.0001)			R-Square = 0.0577 F Statistic = 11.40 (p <.0001)			R-Square = 0.0585 F Statistic = 10.80 (p <.0001)		

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All models and variables are as defined in Table 5.

Table 20 reports the results of re-estimating the yearly regression models by using only 2,806 firm-year observations whose absolute value of total accruals is greater than the median absolute value of total accruals in the data. Employing only the high accrual firms (i.e., whose absolute value of total accruals is greater than the median value of total accruals), I create a dummy variable (D_HIGH) that takes the value of 1 for firms whose size, B/M and price is greater than the median size, price and B/M of the firm-year observations used in the regression analysis. The coefficient of D_HIGH is positive and significant for Models 5 and 6, supporting the result of Lev and Nssim (2004) that there is a greater exploitation of the accrual anomaly among high accruals firms with relatively larger size, B/M ratio and stock price leading to higher adverse selection component of the spread. Similarly, in Table 21 the coefficient of D_HIGH is 0.0344 and 0.0342, in Models 7 and 8, significant at 10% and 1% respectively, once again indicating that the firms having large size, B/M and stock price experience greater exploitation of the accrual anomaly leading to wider bid-ask spreads around earnings announcements. However, the results of a similar test conducted around the 10-Q/K filing dates yields inconclusive results as reported in Table 22.

- Endogeneity Between Accruals and Spreads

Trueman and Titman (1988) and Dye (1988) theorize that the greater the information asymmetry, the more likely a firm is to manage accruals and earnings. Richardson (2000) documents empirical evidence of this theory by taking abnormal accruals from the modified Jones (1995) model as a hypothesized determinant of earnings management and regresses it on information symmetry measures (namely, bid-ask spreads and dispersion

Table 23 –Endogeneity between Accruals and Spreads - Yearly Analysis

This table reports the coefficient estimates and their respective t-statistics for a two-stage regression model estimated to control for any potential endogeneity between bid-ask spreads and abnormal accruals. First, I obtain the predicted value of abnormal accruals by regressing them on all the exogenous variables used in the system to explain accruals and spreads. Next, employing two-stage least squares, I use the predicted value of abnormal accruals in Equation (6) to re-estimate the impact of abnormal accruals on bid-ask spreads after controlling for any simultaneity effects among the two variables. Consistent with Richardson (2000), I employ dispersion, standard deviation of operating cash flows, size, market to book and change in revenue in the regression equation to explain abnormal accruals. The sample size consists of 5,377 firm-year observations for a sample period of 1995-2002.

Dependent Variable = Abnormal Accruals (AB_ACC)				**Dependent Variable = ln(BID_ASK)**			
Variable	**Coeff.**	**t statistic**		**Variable**	**Coeff.**	**t statistic**	
Intercept	-2.684	-19.66	***	Intercept	-0.614	-3.70	***
BID_ASK (+)	0.046	1.49	*	|AB_ACC| (+)	0.008	1.32	*
DISP (+)	0.070	5.63	***	VOL(-)	-0.125	-9.57	***
STD_OCF (+)	0.000	-0.05		SIZE(-)	-0.283	-23.81	***
SIZE (-)	-0.054	-2.90	***	DISP(+)	0.026	4.70	***
B/M (-)	-0.158	-3.94	***	AFOL(-)	0.133	7.51	
CHG_SALES (+)	0.000	4.71	***	PIH(+)	-0.029	-6.28	***
				STDRET(+)	0.293	11.08	***
	R-Square = 0.01613				R-Square = .49802		
	F Statistic = 14.55				F Statistic = 754.56		
	(p <.0001)				(p <.0001)		

Note: *,** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.

among analyst forecasts) and other factors affecting earnings management choices of firms documented in prior literature. His results, interpreted in the light of my theory, suggest the possibility of a simultaneous relationship between spreads and accruals. Therefore, to account for the potential endogeneity between accruals and spreads, I first obtain the predicted value of abnormal accruals by regressing accruals on all the exogenous variables used in the system to explain abnormal accruals and bid-ask spreads. Next, using the predicted value of accruals thus obtained, I employ two-stage least squares to re-estimate the equations that employ bid-ask spread as the dependent variable.

Table 23 reports the results of a two-stage least square model used to control for the potential endogeneity in abnormal accruals and bid-ask spreads in the yearly analysis. The coefficient estimate of abnormal accruals in the second equation that employs bid-ask spread as the dependent variable is 0.008 (p-value = 0.0565) indicating that abnormal accruals account for 0.8% of the variation in total spreads even after accounting for any simultaneity effects between abnormal accruals and total spreads.

- Reduced Sample Test (N=1,362):

Since it is not clear whether the accrual information is first released during earnings announcements or during the 10-Q/K filing dates, therefore for a sample of around 1,400 firms, I determine point of time the information on accruals is first released by going through the earnings announcements to find out if they provide the complete financial statements that lend sufficient information to estimate the total (abnormal) accruals to investors. I, then, structure a similar test around the first release of accrual information and

Table 24 – Alternate Test – Using a Reduced Sample of 1,000 Firms around the First Release of Accrual Information (N = 1,362)

This table reports the regression results of conducting the quarterly event study around the first release of accrual information for s reduced sample of 1,362 firms for which I hand-collected the information on the whether the accrual information was first released during earnings announcements or the 10Q/K dates.

	Dependent Variable = ln(AB_BID_ASK)				Dependent Variable = ln(AB_ADV_SEL)			
	Model 7		Model 8		Model 9		Model 10	
Variable	**Coeff.**	**t-stat**	**Coeff.**	**t-stat**	**Coeff.**	**t-stat**	**Coeff.**	**t-stat**
Intercept	-0.050	-1.19	-0.0164	-0.38	-0.007	-0.39	0.0107	0.56
|TOT_ACC| (+)	-0.014	-2.77			-0.004	-1.70		
|AB_ACC| (+)			-0.0034	-0.65			0.0013	0.58
ABVOL(+)	-0.009	-0.91	-0.0093	-0.99	0.003	0.67	0.0025	0.59
SIZE(-)	-0.008	-1.67 **	-0.0079	-1.61 *	0.000	-0.07	0.0000	-0.02
|UE| (+)	-0.004	-1.79	-0.0039	-1.74	0.000	0.45	0.0005	0.52
|LAG| (+)	-0.001	-0.95	-0.0015	-0.98	0.001	0.98	0.0006	0.91
	R-Square = 0.0067		R-Square = 0.0014		R-Square = -0.003		R-Square = -0.0022	
	F Statistic = 2.84		F Statistic = 1.38		F Statistic = .4723		F Statistic = .40	
	(p <.0001)		(p =0.2278)		(p =0.2278)		(p =0.8494)	

Note: *, ** and *** denote significance at 10%, 5% and 1% respectively based on one-tailed p-values.
All models and variables are as defined in Table 5.

report the results in Table 24. The regression model has very little explanatory power and the results are quite inconclusive.

7. CONCLUDING REMARKS

In this paper, I investigate whether the heterogeneous response among investors to accruals, documented in prior literature, exacerbates information asymmetry in the market. I test this argument by studying the relation between absolute magnitude of total and abnormal accruals on the bid-ask spread and its adverse selection component. I carry out my tests both for all trading activity occurring for firms during the year and around the first release of accrual information. While the yearly association study examines whether firms with high magnitudes of accruals are associated with wider spreads, the quarterly event study investigates whether the increase in spreads around the first release of accrual information is positively related to the magnitude of accruals. The results of the yearly study provide empirical evidence of a positive association between the adverse selection component of the spread and accruals. The total spread is also found to be positively associated with abnormal accruals after controlling for the endogeneity between accruals and spreads.

The results of the quarterly event tests conducted both around earnings announcements and the 10-Q/10-K filing dates indicate that the increase in the adverse selection component of the spread both around earnings announcements and 10Q/10K filing dates is significantly positively related to the absolute magnitude of total accruals. While the results of the yearly analysis depict a positive association between the magnitude of abnormal accruals and the adverse selection component of the spread, this linkage between abnormal adverse selection component and the magnitude of abnormal accruals is found to be insignificant in the event studies. A plausible explanation of this result may lie

in the fact that the heightened degree of information asymmetry among the market participants during non-announcement periods, resulting from heterogeneous interpretation of accruals diminishes the increase in the adverse selection component during earnings announcements (10Q/10K filing dates) that is attributable to the magnitude of accruals.

Furthermore, contrary to the main hypothesis of the study, I find a negative association between total accruals and the total spread both in the yearly analysis and the quarterly event study. One interpretation of these results is that the other two components of the spread, namely, the order processing cost and the inventory holding cost move in a direction opposite to the adverse selection component and subdue the information asymmetry effect of accruals on the total spread. Krinsky and Lee (1996) document that while the adverse selection component of the spread is found to increase during earnings announcement, the other two components of the spread, namely, the order processing cost and the inventory holding cost decline during the same period. They conclude that the total bid-ask spread may not be an accurate measure of information asymmetry in the market.

An alternative explanation to the negative association between accruals and the bid-ask spread may lie in the overall decline in the total spreads resulting from the reduction in tick size introduced in 1997. Goldstein and Kavajecz (2000) document that spreads have declined by a total of 14.3% after NYSE passed a rule to bring down the minimum variation in the spreads from $1/8^{th}$ to $1/16^{th}$ of a dollar per share. If total spreads decline and adverse selection costs remain constant then adverse selection costs as a percentage of total spread would increase and thus the correlation between total spread and its adverse selection component is likely to be negative. It is plausible that an increase in the

magnitude of accruals stimulates an increase in the adverse selection component of the spread. But the negative correlation between the total spread and its adverse selection component dominates or overshadows the positive impact of accruals on the adverse selection component, i.e., accruals and the adverse selection component may be positively linked to each other but both these variables may be negatively related to the total spread.

This study contributes to the existing literature on capital market response to accruals by demonstrating that high magnitudes of accruals exacerbate information asymmetry as evidenced in higher adverse selection component of the spread. Documenting the existence of such a real cost of accruals provides a transactions cost basis for understanding why cost of capital increases with accrual activity (Dechow et al. 1996, Francis et al. 2005) as well as suggesting that the information asymmetries associated with such activity merit serious attention by accounting policy makers.

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VITA

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