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Information Asymmetry and Accounting Restatement: NYSE-AMEX and NASDAQ Evidence

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Information Asymmetry and Accounting Restatement: NYSE-AMEX and NASDAQ Evidence

Abstract: We examine the impact of accounting restatement announcement on firms' value and information asymmetry for both auction market (NYSE-AMEX) and dealer market (NASDAQ) using a public sample of restatement announcements from 1997 to 2005. In both markets, we document economically and significantly negative mean cumulative abnormal returns around the announcement dates. The restatements attributed to auditors are associated with more negative returns than the restatements attributed to management and the SEC. However, there is no significant difference between market reactions arising from the core and non-core restatements. We also find a significant increase in volume, number of transactions, average order size, volatility, and various measures of spreads after the restatement announcement indicating that restatement diminish company prospects and contribute to increased uncertainty and information asymmetry following the announcement. Finally, we find the information asymmetry in NASDAQ around the event date is less pronounced than in NYSE-AMEX.

Information Asymmetry and Accounting Restatement: NYSE-AMEX and NASDAQ Evidence

I. Introduction

Restatement of financial statements and its consequences are becoming an important issue among the investors, corporate managers, regulators, and auditing firms, particularly in the aftermath of the Sarbanes-Oxley Act (SOX) of 2002. Investors and regulators are concerned over restatements to correct non-GAAP accounting in previously issued financial statements. A 2003 Governmental Accounting Office (GAO) report documents a marked increase in the total number of restatements from 1997 to 2002 and a detrimental impact on financial markets from these restatements, as evident by an estimated total loss of $100 billion in market capitalization in the intermediate period after restatement announcement.

Issues surrounding restatement have received considerable attention in academic research. For example, Palmrose, Richardson and Scholz (2004), Anderson and Yohn (2002), Wu (2002) find negative stock price reaction immediately following the restatement announcement. Hribar and Jenkins (2004) find that restatements lead to decreases in expected future earnings and increases in the firm's cost of capital based on expected future earnings. Desai, Hogan, and Wilkins (2006) and Srinivasan (2005) investigate the impact on adverse managerial reputations and penalties imposed by both the labor market and regulators and show that managers face higher turnover and poorer job prospects after a restatement. Some other studies investigate the impact of litigation on restatement (e.g., Palmrose and Scholz (2004), Salavei, Golec and Harding (2009)) and the tax consequences (Erickson, Hanlon, and Maydew (2004)). While there has been a recent upsurge in interest in issues concerning restatement, research on information asymmetry and other microstructure issues created by the restatement

announcement is still lacking. To the best of our knowledge, our paper is the first study that directly examines the trading activities and information asymmetry around the restatement announcement events in two different markets: the auction market of NYSE-AMEX and dealer market of NASDAQ.

When firms restate their financial statements, investors reassess their perceptions about the quality of financial information about them. A restatement corrects past errors in financial statements, and in that sense it may be viewed as improving financial reporting quality. However, it is reasonable to expect that the restatement increases information asymmetry that arises from questions relating to the integrity of management, to the reliability of financial reporting, and to the overall viability of the firm. In other words, prior to the restatement, investors have no particular reason to question management integrity or quality of the financial reporting, whereas after restatement they do. Restatements, therefore, can be viewed as decreasing the quality of information because the investors now believe that not only the past accounting information was of low quality, but also the future information may not be reliable.

There has been significant interest in both industry and academic research whether accounting information quality can impact information asymmetry among the market participants and hence influence firm's cost of capital. For example, the former SEC Chairman Arthur Levitt remarked in his 1997 speech to Inter-American Development Bank "an important benefit of high accounting standard is improved liquidity and lower cost of capital". Levitt (2000) argues that "quality information is the lifeblood of strong, vibrant markets. Without it, liquidity dries up. Fair and efficient markets cease to exist." The issue has also been debated significantly in theoretical research recently. Lambert, Leuz, and Verrecchia (2007) construct a model within the theoretical framework of the CAPM and show that the quality of accounting

information impacts the cost of capital directly because higher quality disclosures reduce the firm's assessed covariances with other firms' cash flows. These covariance risks are non-diversifiable. However, Easley and O'Hara (2004) argue that quality of information may not impact cost of capital directly but through the non-diversifiable information risk channel. They show that poor accounting information quality can induce information asymmetry and increase information risk because less informed investors are always at a disadvantage relative to informed investors in adjusting their portfolio weights. This information risk is non-diversifiable therefore, investors demand higher returns from a firm with high information asymmetry arising from a low quality accounting information.

Another related strand of literature that focuses on information asymmetry arising from poor accounting information is explained by the theoretical model of Kim and Verrecchia (1994, 1997). Their model demonstrates that information asymmetry is not just due to inside information but also due to the superior ability to process public information. Low quality accounting information can increase information advantage of some sophisticated investors who have superior ability to process the information. This information advantage, in turn, may increase the information asymmetry among the market participants. Theoretical model by Kyle (1985), Copeland (1976), Glosten and Milgrom (1985) predict that information asymmetry can increase adverse selection risk for liquidity providers who then demand a larger compensation for providing liquidity. As a result, liquidity cost is higher, and hence the cost of capital too is higher (Amihud and Mendelson (1986), Brennan and Subramanyam (1996)).

In this paper, we study the impact of financial restatement announcements on information asymmetry and market microstructure activities in the stock market. We use a sample of restatement announcements from 1997 to 2005 collected from GAO Financial Statement

Restatement Database.[1] We investigate information asymmetry around the announcement by examining various trading activities, such as, stock returns, trading volume, number of transactions, volatility, order size, and spreads in both NYSE-AMEX and NASDAQ markets. We document economically and statistically negative mean cumulative abnormal returns around the announcement dates. The restatements attributed to auditors are associated with more negative returns than the restatements attributed to management and the SEC. However, we do not find any significant difference between the abnormal returns of restatements related to core accounts and to non-core accounts, implying that the market reacts to the core restatement announcements in a manner similar to the non-core restatement announcements. The abnormal return results are consistent with the notion that restatements tend to diminish company prospects and increase uncertainty (Moore and Pfeiffer (2009) and Richardson et al. (2002)).

In addition to the abnormal returns, we examine the time series of changes in volume, number of transactions, average order size, volatility, and various measures of spreads around the restatement announcements. We find little evidence of increased spreads and other trading metrics prior to the announcement. However, we document a significant increase in these metrics after the announcement. The increase in volume or number of transactions could be an increase in adverse trades because informed investors exploit their informational advantage (Kyle (1985)). Easley and O'Hara (1987) suggest that informed traders will choose to trade larger amounts and therefore, that order size (average trading volume per transaction) may proxy for informed trading and an increase in order size should be observed around the event date. We document a significant increase in the abnormal order size after the restatement announcement which is consistent with Easley and O'Hara (1987)'s model.

[1] The database is created by the United States General Accounting Office, Washington, DC 20548.

We find a significant increase in both abnormal relative quoted spread and abnormal relative effective spread after the announcement. A restatement is an indication to investors that managers are not credible and that the public financial information provided by managers is less than reliable, therefore investors are more likely to be skeptical about the reliability of the firm's past financial statements as well as the firm's future financial information to be released. This investors' skepticism creates a high uncertainty or high information asymmetry environment in the market. As a result, bid-ask spread widens to compensate for adverse selection risk the dealers or specialists may face. The result is consistent with the adverse selection literature, e.g., Kyle (1985), Verrecchia (1981), Copeland (1976), Glosten and Milgrom (1985) suggest that if market conditions are such that dealers or specialists become concerned that there is a higher proportion of informed traders in the market or that the informed traders have better information, they will widen the bid-ask spread to compensate for the adverse selection risk. We also document a significant increase in abnormal daily return volatility measured as standard deviation of the trade-to-trade returns within the day after the announcements. Assuming that the return volatility measures market participants' uncertainty over the firm value, a larger increase in the return volatility is consistent with greater firm value uncertainty created by the restatement events.

In order to account for other events that may affect the trading activities but unrelated to the restatement announcement, we compare the results of the restatement firms with those of the matching firms based on SIC code and size. Unlike the restatement firms, we do not document any significant increase in all the measures of the trading metrics for the matching firms around the announcement date. The abnormal returns of the matching firms are stable over time with no significant changes around the event dates. Therefore, the increased uncertainty, increased

adverse selection, and increased negative market reactions after the restatement announcements should be attributed to the effect of restatement announcements only, not to other events that might have affected the restatement firms during the event periods.

We also postulate a cross sectional regression analysis to further examine the impact of trading activities on the spread during both nonevent and event trading periods. We observe a positive overall relation between spread and order size during periods of normal trading, which is consistent with Easley and O'Hara (1987) which views large trades as more likely to be privately informed and is evidence of adverse selection. The relation between spread and order size during the restatement event period is also significantly positive implying an increase in adverse selection during the event window, which is consistent with the univariate analysis.

We also examine the trading activities and adverse selection around the restatement announcements of NASDAQ restatement firms. Many studies have examined the difference in market microstructures between the NYSE and NASDAQ and find that NSADAQ has significantly higher transaction costs than that of NYSE (e.g., Christie and Schultz (1994), Huang and Stoll (1996), Bessembinder and Kaufman (1997), Weston (2000)) and adverse selection costs are significantly higher on NYSE than on NASDAQ (e.g., Affleck-Graves, Shantaram, and Miller (1994), Lin, Sanger and Booth (1995), and Huang and Stoll (1996)). The results with NASDAQ restatement firms are generally similar to those with NYSE-AMEX restatements. The univariate results show that there is a significant increase in abnormal trading activities and adverse selection after the restatement announcements in NASDAQ, however, it appears that the level of adverse selection in NASDAQ around the event window is less severe than that in NYSE-AMEX. Additionally, we do not detect any evidence of increased adverse selection around the announcement in the cross sectional regression analysis.

Our paper contributes to the literature in several ways. Prior research shows that accounting restatements are salient negative firm-specific events, associated with a decrease in firm value, future earnings prospects and creditability of management. Unlike earning announcements and other popular corporate events, restatement event is little known to investors before it is made public. Investors seem to know about the restatement event only ex post. The restatement announcements, therefore, provide an ideal setting to study information asymmetry and microstructure activities. However, research in this area is rather limited. Our paper is the first study that examines the trading activities and information asymmetries related to the restatement announcement using intraday data and the matching firm approach. An important benefit of our approach is that using high frequency data, market microstructure based empirical measures of information asymmetry can be estimated with high precision. Second, we provide empirical evidence to support important theoretical microstructure models of Easley and O'Hara (2004) and Kim and Verrecchia (1994, 1997) in that poor quality information can give rise to information asymmetry among the participants in financial market. Also, our paper is the first study that directly examines the difference in trading activities and information asymmetry around the restatement announcement event in NYSE-AMEX and NASDAQ.

The rest of the paper is organized as follows. Section II discusses background of restatement and related literature. Section III describes the data and method employed in the paper. Section IV discusses the results of both univariate and cross sectional analyses and NASDAQ restatements. Section V concludes the paper.

II. Background and Related Literature

A restatement is an indication to investors that managers are not credible and that the public financial information provided by managers is less than reliable. There has been a recent

upsurge in interest in issues concerning restatement. For example, Richardson et al. (2002) show that the primary motivation to manipulate earnings is to attract external financing at a lower cost. Restating firms have high market expectations for future earnings growth and have higher levels of outstanding debt. They also document that information in accruals, specifically operating and investing accruals, are key indicators of the earnings manipulations that lead to restatements. Palmrose et al. (2004) examine the market reaction to restatement announcements and find an overall significant negative abnormal return (about 9 percent) over a two-day event window. Palmrose et al. (2004) also find a significant association between the dispersion of earnings forecasts by analysts and restatement announcements. Wu (2002) examine a three-day price response around the restatement announcements and find that restatements are regarded bad news in the market and the market reaction is stronger when the amount restated is larger. Anderson and Yohn (2002) examine the market returns and the bid-ask spread effects at the announcement of the accounting problem that leads to restatement using a 7-day window and negative market returns for accounting problem announcements and the negative reaction is most pronounced for firms with revenue recognition issues. They also find an increase in spreads surrounding the announcement of revenue recognition problems.

Using conditional total accruals measure as their proxy for reporting strategies, Moore and Pfeiffer (2009) find that restatement firms do not change their reporting strategies after a restatement even though investors have learned that the strategy has resulted in misstated financial statements. Their findings suggest investors' increased skepticism of management and decreases in the quality of earnings following a restatement. Desai, Hogan, and Wilkins (2006) investigate the impact on adverse managerial reputations and penalties imposed by both the labor market and regulators. Srinivasan (2005) also showed that directors of companies that have

restatements incur significant labor market penalties. Akhigbe, Kudla, and Madura (2005) also find negative market reaction particularly if restatement is due to corrections in revenue estimates and when revised earning lead to revised expectations of future earnings. The impact on litigation is investigated by Palmrose and Scholz (2004) and the tax consequences are examined by Erickson, Hanlon, and Maydew (2004).

Prior research suggests that public financial disclosure should reduce information asymmetry in the stock market (Verrecchia (1982), Diamond (1985)). However, other research contends that not only the existence but also the quality of the information may affect the information asymmetry in the market, hence firm's cost of capital. For example, Lambert, Leuz, and Verrecchia (2007) show that the quality of accounting information can influence the cost of capital directly because higher quality disclosures reduce the firm's assessed covariances with other firms' cash flows. Easley and O'Hara (2004) propose that poor accounting information quality can induce information asymmetry and therefore, increase non diversifiable information risk because less informed investors are always at a disadvantage relative to informed investors in adjusting their portfolio weights. As a result, investors expect higher returns from a firm with high information asymmetry or low quality accounting information. Kim and Verrecchia (1994, 1997) demonstrate that low quality accounting information can increase information advantage of some sophisticated investors who have superior ability to process the information. This information advantage, in turn, may increase the information asymmetry among the market participants. Restatement can be viewed as low quality information because the investors now believe that not only the past accounting information was of low quality, but also the future information may not be reliable, therefore, information asymmetry is expected to increase around the restatement announcements.

Theoretical model by Kyle (1985), Copeland (1976), Glosten and Milgrom (1985) predict that information asymmetry can increase adverse selection risk for liquidity providers or market makers who in turn, demand a larger compensation for providing liquidity. As a result, these market makers widen bid-ask spread to compensate for the adverse selection risk.

There are two principal theories that explain the bid-ask spread: (1) asymmetric information model and (2) inventory control model. In asymmetric information model, dealers (market makers) trade with liquidity traders and informed traders. The latter groups have information which is superior to the dealers, so bid and ask prices are set in order to compensate dealers for the perceived adverse selection risk. Kyle (1985), Copeland (1976), Glosten and Milgrom (1985) all argue that if market conditions are such that dealers become concerned that there is a higher proportion of informed traders in the market or that the informed traders have better information, they will widen bid-ask spread to compensate for the adverse selection risk.

The prediction of the adverse selection models is that spread should widen before an announcement as there is increased probability that trades are initiated by investors with superior information, while spreads should fall after an announcement, once the information has become public. However, it is possible that within context of these models, spreads may not fall immediately after the announcement, as there is still some advantage to be gained by market participants who did not have superior information but have superior-information processing abilities. For example, Kim and Verrecchia (1994) argue that the directors or corporate insiders may have superior information but they are prohibited from trading before the announcement dates, so they are able to make use of it only after the announcements. Therefore, Kim and Verrecchia (1994) suggest that disclosure of information would cause increased information asymmetry risk, so that spread should widen after the announcement rather than before it.

However, in either case, one would expect spreads to return to normal levels within a few days of the announcement.

These studies suggest a positive relationship between spreads and order size (proxy for adverse selection cost), since dealers interpret an increase in order size as a sign of an increased number of informed traders and widen their spreads accordingly. Furthermore, Kim and Verrecchia (1991a, 1991b) argue that heterogeneous beliefs around the corporate announcements induce market participants to trade. Therefore, they suggest that increased information asymmetry at announcement dates should result in higher trading volumes as well as increased spreads.

According to the inventory control models, risk-averse market makers have a desired (optimal) inventory position. To maintain this optimal inventory level, the market makers face two types of risk: (1) the risk of being unable to trade the stock and (2) the risk that prices will change while stocks are being held. Amihud and Mendelson (1980) and Ho and Stoll (1980) argue that the higher the first risk, the more difficult for the market makers to return to their optimal inventory level. In a liquid market characterized by high trading volumes, the dealer (market maker) will only set a narrow inventory spread, since he/she is assured of being able to quickly restore an out-of-equilibrium position. The inventory model, therefore, predict that as the liquidity of stock increases (i.e., trading volume increases), the market maker will reduce the spread since the compensation during this period is lower, resulting in a negative relationship between trading volumes and spreads.

The second feature of inventory risk is related to the underlying variability of the stock return. Garber and Silber (1979) and Ho and Stoll (1981) show that the more volatile the stock price is, the more the market maker is exposed to the risk of adverse price movements, and

consequently, the spread will be widened to compensate the market maker, leading to a positive relation between return variability and the spread.

Finally, besides adverse selection and inventory components as discussed above, Roll (1984) and Stoll (1989) identify another component of bid-ask spread which is the order processing cost. According to the order processing cost model, the dealers need to recover fixed transaction costs through the bid-ask spread. The fixed cost will be lower if the dealers make a large volume of trades. Therefore, the model will imply the negative relationship between number of transactions and spread.

III. Data and Method

1. Data

We use a statement announcement sample from United States General Accounting Office (GAO) from 1997-2005. This is the most comprehensive public sample we could obtain. We separate the firms in NYSE-AMEX and NASDAQ to investigate the difference of the effect of restatement announcements on the two markets. In order to compute bid-ask spread and other microstructure variables (volume, number of transactions, volatility, order size), we use intraday quotes and trades from TAQ database. Following the microstructure literature, before computing the variables, we screen the data as given below.

For the trades file, we retain the following:

- Trades inside regular trading hours (9:30-16:00)
- Good trades (corr = 0, 1) under regular sale conditions (cond = blank or *)
- Trades with positive trade price (price > 0) and positive trade size (siz > 0)

For the quotes file, we retain the following:

- Quotes inside regular trading hours (9:30-16:00)

- Regular quotes (mode = 12)
- Quotes with positive bid price (bid > 0), positive ask price (ofr > 0), bid price greater than ask price (ofr > bid), positive bid size (bidsiz > 0) or positive ask size (ofrsiz > 0)

Following Lee and Ready (1991), we match each trade with the latest available quote at least 5 seconds earlier. To classify the order flow of each trade as a buyer-initiated or seller-initiated, we use the standard Lee-Ready algorithm, which involves a "quote test" and a "tick test". For the "quote test", any trade that takes place above (below) the midpoint of the current quoted spread is classified as a buy (sell) order because trades originating from buyers (sellers) will most likely be executed at or near the bid (ask). For trades taking place at the midpoint, we use a "tick test" to classify a trade as a buy (sell) order if the trade price is above (below) the previous price. In the event there is no change in the trade price, the order flow is regarded as indeterminable and this trade is not used in computations that require an order flow indicator.

We use intraday data to estimate daily variables, spread, trading volume, number of transactions, volatility, and order size. For each stock, we compute daily trading volume and number of transactions as the total trading volume and total number of transactions within the day. Daily volatility is the standard deviation of the stock return within the day. Daily order size is the average number of shares traded per transaction on that day. For measures of spread, we use the two relative spread measures commonly used in market microstructure literature, relative quoted spread and relative effective spread. These relative spreads are used to estimate market makers' revenue and conversely, investors' cost for a round-trip transaction. The underlying assumptions of the quoted spread are that market makers set the prevailing quotes and stand on the other side of the customer trades, and that the investors cannot trade within the quoted

spread. For each quote at time *s* for firm-quarter *i*, we compute the intraday relative quoted spread, $IntraQSpread_{i,s}$, as follows:

$$IntraQspread_{i,s} = \frac{ask_{i,s} - bid_{i,s}}{(ask_{i,s} + bid_{i,s})/2} \quad (1)$$

We compute daily relative quoted spread, *QSpread*, by equal-weighting *IntraQSpread* within each day. The effective spread is based on the notion that trade is only costly to the investor to the extent that the trade price deviates from the true price, approximated by the bid-ask midpoint. For each trade-matched quote at time *s* for firm-quarter *i*, we compute the intraday relative effective spread, $IntraESpread_{i,s}$, as follows:

$$IntraEspread_{i,s} = \frac{2\left|\text{trade price}_{i,s} - (bid_{i,s} + ask_{i,s})/2\right|}{\text{trade price}_{i,s}} \quad (2)$$

Where, $trade\ price_{i,s}$ is the trade price at which the trade executed at time *s* for firm-quarter *i*. We compute daily relative effective spread, *ESpread*, by equal-weighting *IntraESpread* within each day. As a check for robustness, we also use daily quoted spread and daily effective spread computed in a similar manner.

2. Univariate test

We examine the abnormal changes in spreads, volume, number of transactions, volume per transactions (order size), volatility, and return. To reduce the effect of outliers, we natural-log transform all variables except for the return. The following method helps to determine the abnormal changes. We compute average daily values of spreads, trading volumes, number of transactions, order size, and volatility over a 'normal trading period' that spans from day -250 to day -30 relative to the restatement announcement date. . We then compute a time series of abnormal daily spreads and other variables by taking the daily value on a given day less normal value calculated from the normal trading period as defined above. We obtain the abnormal return

from the market model in the event study approach with the estimation period that also ranges from day -250 to day -30 relative to the announcement date. These abnormal trading activities consider only firm-specific trading. They do not take into account other events unrelated to restatement announcements, which may potentially affect the trading activities.. In order to account for this possibility, we use matching firm approach based on SIC code and size. More specifically, for a restatement firm, we select the matching firm closest in size (market capitalization at least 30 days before the announcement) within the same four-digit SIC code. If we are unable to find a match, we relax the four-digit to three-digit level and find the matching firm closest in size to the restatement firm. Then we calculate the abnormal trading activities for the matching firm and compare them with those of the restatement firm. The difference between the two samples should be attributed to the effect of restatement announcements.

3. Cross sectional tests

We use cross sectional regression analysis to further examine the impact of trading activities on the spread during both non-event and event trading. Dummy variables facilitate testing for event-related shifts in the intercept and the slope coefficients on the variables studied. The event window is split relative to the announcement date (day 0) into three sub periods: PRE (day –10 through day –1), DURING (day 0 and day 1), and POST (day +2 through day +10). . Many microstructure artifacts considered here proxy for the sources of bid-ask spread documented in the literature. For instance, number of transactions proxy for order processing costs, order size for adverse selection cost, and price and return variability for inventory cost. Similar control variables are used in Conrad and Niden (1992), Lee et al. (1993), Welker (1995), Yohn (1998), Ertimur (2004), among others. To the extent that these control variables are adequate, one can interpret the coefficients on order size variable as the effect of adverse

selection on the spread during non-event trading period, and the coefficient on the order size variable during the restatement announcement period as effect of adverse selection on the spread during the event period. We use first differences to control for serial correlation in the variables. The model is as follows:

$$\begin{aligned}\Delta \ln(SPREAD)_{it} = {} & a_0 + a_1 \Delta \ln(PRICE)_{it} + a_2 \Delta \ln(VOLATILITY)_{it} + a_3 \Delta \ln(NTRANS)_{it} \\ & + a_4 \Delta \ln(ORDERSIZE)_{it} + a_5 PRE + a_6 DURING + a_7 POST \\ & + a_8 PRE \times \Delta \ln(ORDERSIZE)_{it} + a_9 DURING \times \Delta \ln(ORDERSIZE)_{it} \\ & + a_{10} POST \times \Delta \ln(ORDERSIZE)_{it} + a_{11} COMPANY + a_{12} SEC_{it} \\ & + a_{13} AUDITOR + \varepsilon_{it} \end{aligned} \quad (3)$$

where,

$\Delta \ln(SPREAD)_{it}$: the change in natural log of spread (quoted spread, effective spread, relative quoted spread, and relative effective spread);

$\Delta \ln(PRICE)_{it}$: the change in natural log of mean price of day t of stock i;

$\Delta \ln(VOLATILiTY)_{it}$; the change in natural log of volatility of day t of stock i;

$\Delta \ln(NTRANS)_{it}$: the change in natural log of number of transactions:

$\Delta \ln(ORDERSIZE)_{it}$: the change in natural log of order size; PRE, $DURING$, $POST$ are the event period dummies corresponding to day -10 through day -1, day 0 through day 1, day 2 through day 10 (relative to the announcement date), espectively; $COMPANY, SEC, AUDITOR$ are the dummies for restatement initiators, company, SEC, and auditor, respectively. The data are stacked across firms and days from day -250 to day 250 (relative to the announcement date). We employ White (1980)'s method to correct for heteroscedasticity.

IV. Results and Analysis

1. Descriptive statistics

Table 1 presents descriptive statistics for NYSE-AMEX and NASDAQ restatements. The number of restatements increases from 23 (2.5 percent) in 1997 to 240 (26.1 percent) in 2005 for NYSE-AMEX, and from 57 (5.8 percent) in 1997 to 207 (20.9 percent) in 2005 for NASDAQ. Manufacturing industry accounts for the most number of restatements in both NYSE-AMEX and NASDAQ (29.1 percent and 28.2 percent, respectively). About half of the restatements pertains to revenue recognition (22.5 percent in NYSE-AMEX and 28.7 percent in NASDAQ) and to cost or expense (29.5 percent in NYSE-AMEX and 27.7 percent in NASDAQ). The company initiates most of the restatements (55 percent) in both NYSE-AMEX and NASDAQ, while Auditor and SEC initiate lesser number of restatements (10.7 percent and 10.1 percent in NYSE-AMEX and 11.4 percent and 9.5 percent in NASDAQ, respectively). Figure 1 graphically shows the distribution of restatements by year, industry, reason, and initiators for both NYSE-AMEX and NASDAQ. It is noteworthy that the distribution in each category is very similar for both markets regardless of the differences in their market micro-structure.

Table 2 presents descriptive statistics for both the restatement firms and matching firms in NYSE-AMEX and NASDAQ. Our matches show fairly close fit along most dimensions. The mean and median share price (pre-announcement) for restatement firms are 21.23 and 17.25, respectively in NYSE-AMEX while those of the matching firms are 24.49 and 19.84, respectively. Restatement firms and matching firms also have similar number of shares outstanding, market cap and book-to-market ratio. We also include a comparison of the beta, a measure of systematic risk of the firms. As can be seen from Table 2, the betas are similar for both restatement firms and matching firms. This implies that any difference between the

restatement and matching firms might not be explained by beta. The matching firms closely fit to the restatement firms in NASDAQ as well. The restatement firms and matching firms in NASDAQ are quite smaller than those in NYSE-AMEX, with lower share price and number of shares outstanding.

2. Univariate Test

Table 3 presents mean cumulative abnormal return (CAR) for restatements by core and non-core reasons, and by initiators. Following Palmrose et al. (2004), we define core restatements as the ones in which the restatement is due to cost or expense and revenue recognition. For all other reasons, the restatements are considered non-core restatements. We document negative abnormal returns around the announcement. From 1997-2006, the CARs on the announcement date, day 0, and on day +1 are -1.86 percent and -1.66 percent, respectively. For the two-day window [0, 1], the CAR is -3.5 percent. Our estimates of CAR are lower than those in some early studies, [e.g., Palmrose et al (2004) and GAO (2003)], but are consistent with those in the recent studies [e.g., Scholz (2008), Hranaiova and Byers (2008), Wang and Yu (2008)]. These recent studies attribute the reduced market reactions to restatement to the SOX effect. They suggest that the SOX increases the probability of detecting errors in the previously issued financial statements, hence reducing the market reactions to the announcements. The two-day window CAR [0, 1] for core restatements (-3.74 percent) is somewhat smaller than that of non-core restatements (-4.14 percent). However, the difference between them is not statistically significant, implying that the market reacts to core restatement announcement in a similar manner as to the non-core restatement announcements.

Our results indicate that the restatements initiated by the auditors have the most negative abnormal returns (-4.79 percent) while the SEC initiated restatements have the least negative

abnormal returns (-2.21 percent). The CARs for the restatements initiated by the companies themselves and by unidentified groups are -1.75 percent and - 1.21 percent respectively. These results are consistent with Palmrose et al (2004). Attribution to outside parties such as auditors signals that the internal monitoring functions of companies failed not only to prevent, but also to identify and correct a material mis-statement. Conversely, detection and revelation by the company provide some indication of relatively stronger internal controls and oversight by management, boards and audit committees. These internal measures may reduce the likelihood of top management involvement in creating mis-statements and mitigate some of the uncertainty surrounding the management's creditability and reliability. Thus, we expect that the market reaction is stronger for auditor initiated restatements than for company initiated restatements. The restatements by SEC, however, might send a mixed signal to the market. On one hand, the market might view these restatements negatively because of the uncertainty related to management creditability and reliability, but on the other hand, the market reaction to these restatements may be attenuated if market participants perceive the issues as technical matters or judgment disagreements between the SEC and companies and/or auditors.

Table 4 shows the average daily abnormal trading activities around the announcement day for all the restatement companies in NYSE-AMEX. All variables are log-transformed for further computation. We report both mean and median for each variable for stronger results. The t-statistics in the parenthesis are reported for the mean while the p-values of the non-parametric Wilcoxon test in the squared bracket are reported for the median to examine whether the mean and median are statistically different from zero. As can be seen from the table, there is no significant abnormal activity before the announcement. It implies that, unlike earning announcements and other popular corporate events, restatement event is little known to investors

before it is made public. Investors seem to know about the restatement event only after the public announcements. However, when the event is made public, the market reacts quite strongly to the news. We can see significant positive abnormal changes beginning at the announcement day and continue for all five days after the announcement in all trading activities such as volume, number of transactions, order size, volatility, and the two measures of spreads (relative quoted spread and relative effective spread). The evidence clearly supports the existence of informed trading around the announcement day. The increase in volume or number of transactions could be an increase in adverse trades because informed investors exploit their informational advantage [Kyle (1985)]. However, in the literature, there is some ambiguity on whether trading volume increases in adverse selection during corporate event announcements. For example, if liquidity traders have discretion over timing of the trades, then there could be a decrease in volume [Admati and Pfleider (1988) and Tinic and West (1972)]. It may be due to trades arising from the lack of consensus among market participants [Verrecchia (1981)]. Some other studies suggest alternative measures to proxy for adverse selection. For example, Easley and O'Hara (1987) contend that informed traders choose to trade larger amounts and hence the order size (average trading volume per transaction) may proxy for informed trading. If informed trading is associated with large orders, an increase in the order size and a stronger positive relation betweeen the order size and spread should be observed around the announcement. This hypothesis has been supported by Conrad and Niden (1987). Consistent with Easley and O'Hara (1987)'s prediction our results also document a significant increase in the abnormal order size after the restatement announcement.

Table 4 also presents the response of spreads around the restatement announcements. We document a significant increase in both abnormal relative quoted spread and abnormal relative

effective spread.[2] A restatement is an indication to investors that managers are not credible and that the public financial information provided by managers is less than reliable, therefore investors are more likely to be skeptical about the reliability of the firm's past financial statements as well as the firm's future financial information to be released. Such a skepticism inevitably creates a information asymmetry in the market and a high degree of uncertainty. As a result, bid-ask spread should increase to compensate for adverse selection risk the dealers or specialists may face. The result is consistent with adverse selection literature, [Kyle (1985), Easley and O'Hara (1987), Glosten and Milgrom (1985)], which suggests that if market conditions are such that dealers or specialists become concerned that there is a higher proportion of informed traders in the market or that the informed traders have better information, they will widen bid-ask spread to compensate for the adverse selection risk.

Our results are also consistent with the theoretical model of Kim and Verrecchia (1994, 1997). They suggest that restatement announcements can increase information advantage of some sophisticated investors who have superior ability to process the information. Once the information is released, these sophisticated investors are able to analyze and advantageously act upon it better than other participants. This information advantage, in turn, increases the information asymmetry among the market participants. As a result, the dealers or specialists widen bid-ask spread to compensate for the adverse selection risk as documented in our spread results.

We also observe a significant increase in abnormal daily return volatility measured as standard deviation of the trade-to-trade returns within the day after the announcements. Assuming that return volatility measures market participants' uncertainty over firm value, a

[2] We also document similar results for the other two measures of spread: quoted spread and effective spread. The results are not reported for space consideration but are available upon request.

larger increase in return volatility is consistent with greater uncertainty in the firm value created by the restatement events. Interestingly, the return volatility pattern is similar to spread and order size patterns. These results provide support of the positive association between uncertainty about the firm value and adverse selection as discussed earlier.

In order to account for non-events that may affect the trading activities, we use matching firm approach based on SIC code and size as discussed earlier. The matching firms and the restatement firms have very similar risk characteristics, therefore any difference in their abnormal market trading activities should be attributed to the effect of the restatement announcements. Figure 2 reports the abnormal trading activities around the announcement date for both matching and restatement firms. The results are quite remarkable. In all the activities under consideration, such as volume, number of transactions, order size, volatility, and spreads, we do not document any significant increase for the matching firms around the announcement date while these activities with the restatement firms increase substantially after the announcements. The abnormal returns of the restatement firms decrease significantly after the announcements implying a negative market reaction to the restatement event. However, the abnormal returns of the matching firms are stable over time with no significant changes around the event dates. Thus, the significant increase in the abnormal trading activities and the significant decrease in the abnormal returns should be attributed mainly to the effect of restatement announcements only. Other variables unrelated to restatement may have no impact on the restatement firms during the event period. We also compare the abnormal trading activities of core restatements and non-core restatements as defined earlier. It is possible that investors could perceive mis-statements of the core accounts as severe lapses that decrease the reliability of earnings and directly inhibit their ability to forecast earnings, therefore, the market

may react more negatively with the core restatements than they do with the non-core restatements. However, there are mixed results in the previous literature about whether there is an association between restatement effects and the accounts that are restated. Palmrose et al. (2004) and Andeson and Yohn (2002) find that restatements related to revenue recognition are associated with more negative market response than other restatements, but Hribar and Jenkins (2004) do not find significant evidence that core account restatements are associated with a greater implied cost of capital effect. Our results of core and non-core restatements are exhibited in Figure 3. We do not find any significant difference in abnormal trading activities and abnormal returns between the core and non-core restatements. This implies that the market reacts negatively in a similar manner between the two types of restatements.

We also explore whether the market reacts differently to the restatements initiated by SEC, auditors, and management of the companies. Palmrose et al. (2004) and Hribar and Jenkins (2004) have documented a more negative market response associated with auditor-initiated restatements than those associated with the SEC. Restatements initiated by the management tend to reassure the market that management is forthright and trustworthy, while restatements initiated by the auditors may ensue a negative market reaction and possibly a greater uncertainty and information asymmetry. This notion is supported by our results presented in Figure 4. We observe that the auditor-initiated restatements generate far greater abnormal volatility and spreads, and more negative abnormal returns than the management and SEC-initiated restatements. This means that the auditor-initiated restatements give rise to greater uncertainty and adverse selection, which in turn result in negative market artifacts.

In summary, the univariate tests provide evidence of increased uncertainty (measured by abnormal volatility), increased adverse selection (measured by abnormal volume, number of

transactions, order size, and spreads), and increased negative market reactions (measured by negative abnormal returns) immediately following the restatement announcements. A caveat with the univariate tests is we have not controlled for the changes in the inventory holding and order processing cost components of the spreads as suggested in literature [Stoll (1988)]. In the next section, we present a cross-sectional analysis that includes appropriate control variables in the regression tests so that we can make stronger inferences on the extent of adverse selection associated with restatement announcements.

3. Cross-Sectional Tests

We use cross sectional regression analysis to further examine the impact of adverse selection, order processing, and inventory holding costs on the spreads during both nonevent and event trading. The model is discussed earlier in the method section. Table 5 presents results on all the four measures of spread, namely proportional effective spread, relative quoted spread, effective spread, and quoted spread. As can be seen from the table, for core restatements, volatility significantly and positively affects all the four measures of spread. However, volatility's influence on spread is neither significant for the non-core restatements nor for the overall sample. This suggests that the core restatements may create more uncertainty in the market than the non-core restatements causing a positive relation between spreads and volatility. The positive relation between price and effective and quoted spreads is consistent with the inventory carrying cost model and with the extant results documented in prior studies. The positive coefficient on the order size variable for the overall sample as well as for core and non-core restatements is consistent with the model of Easley and O'Hara (1987). If the informed traders do tend to trade in larger quantities as Easley and O'Hara (1987) suggest, then this result

implies that the specialist tends to increase the spreads for large orders in order to compensate for a higher probability that these traders represent private information.

The significantly positive coefficient on the changes in the number of transactions may be a result of estimating the model in the first difference rather than levels. We also estimate the model using the levels of the variables and find the significantly negative cross sectional relation between spread and number of transactions which is consistent with order processing cost literature.

During the event window, which is partitioned into pre-announcement, during and post-announcement periods, we document positively significant coefficient of order size during the event period [0, 1]. In particular, most of the coefficients of the variable $DURING \times \Delta \ln(ORDERSIZE)$ are significantly positive at five percent level or below for all four measures of spreads in the core and non-core restatements as well as in the overall sample. This result implies an increase in adverse selection during the event window which is consistent with the univariate analysis. Our result here provides a support to the theoretical model of Kim and Verrecchia (1994, 1997). They suggest that after the announcement, there is still some advantage to be gained by market participants, who possess no superior information but have superior-information processing ability. Corporate insiders, who are in possession of superior information but are prohibited from trading before the announcement dates, can make use of the information after the announcements. Our findings on wider spreads post announcements are consistent with the above cited studies in that the disclosure of information generates increased information asymmetry and adverse selection risk

We also perform a similar cross sectional regression for the matching firms to examine whether there is any increase in adverse selection around the restatement announcement dates

after controlling for other components of bid-ask spread. The results are reported in Table 6. During non-event trading periods, the signs of variables are consistent with those of the restatement firms. However, we do not find any significant increase in order size which proxy for adverse selection cost of the bid-ask spread during the event window. The coefficients of the variable $DURING \times \Delta \ln(ORDERSIZE)$ are not significant for all the four measures of spread. The result with regard to the matching firms suggests that the significant increase in adverse selection during the event window is unique only to the restatement firms and not to the non restatement firms with similar risk characteristics.

4. NASDAQ Restatements

Existing microstructure studies on bid-ask spread and information asymmetry are primarily developed within the framework of an auction market such as NYSE-AMEX as against the dealer market such as NASDAQ. The NYSE and AMEX, as auction markets, rely on a single specialist to make a market in the stock. Specialists facilitate continuous trading by posting quotes for their own account or by reflecting the best quotes on their limit order book, which represent a centralized depository for limit orders to buy or sell stocks at specified prices or better. The NASDAQ market, on the other hand, being a dealer based market, typically has several dealers making a market in a given stock. Thus order flow is broken up across the dealers. This structure provides greater opportunity for an informed trader to distribute his/her trades across a number of dealers. Also, the NYSE-AMEX has the advantage of having direct face-to-face interaction between the market participants and the specialist, while no such interaction occurs on the NASDAQ. This direct interaction provides additional information to the market maker about parties with whom he/she is trading, leading to reduced adverse selection [Stoll and Whaley (1990) and Biais (1993)]. In addition, due to his/her limited monopoly power,

the specialist is better able to spread adverse selection risk across trades as suggested by Glosten (1989). All these factors are likely to impact the amount of adverse selection cost that is impounded in the bid-ask spread.

Many studies have examined the difference in market microstructures between the NYSE and NASDAQ. Christie and Schultz (1994), Huang and Stoll (1996), Bessembinder and Kaufman (1997), Weston (2000), and Chung, Van Ness, and Van Ness (2003) find that the spreads are higher on NASDAQ than on NYSE. Christie and Huang (1994), Christie and Schultz (1994), Barclay (1997), and Jain and Kim (2006) provide evidence that spreads become lower for stocks, which are relocated from NASDAQ to NYSE. These studies suggest that NSADAQ has significantly higher transaction costs than NYSE. Affleck-Graves, Shantaram, and Miller (1994), Lin, Sanger and Booth (1995), and Huang and Stoll (1996) study components of bid-ask spread on markets of different structures and suggest that adverse selection costs are significantly higher on NYSE than on NASDAQ. However, Van Ness, Van Ness, and Warr (1999) suggest that information asymmetry is less severe on the NYSE than on the NASDAQ.

In this section, we examine the trading activities and adverse selection around the restatement announcements of NASDAQ restatement firms. The univariate results of abnormal trading activities are reported in Table 7 and Figure 5 for both restatement and matching firms. We document a very similar pattern as observed with NYSE-AMEX. There is a significant increase in abnormal trading volume, number of transactions, volatility, order size, and spreads. The abnormal returns fall substantially after the announcements. Our results also indicate increased uncertainty, increased adverse selection, and increased negative market reactions after the restatement announcements. Further, we find the market reacts more negatively with NASDAQ restatements than with NYSE-AMEX restatements. The cumulative abnormal returns

of the restatement firms in NASDAQ on day 0 and +1 are -2.55 percent and -3.14 percent, respectively, while those in NYSE-AMEX are -1.86 percent and -1.66 percent, respectively. However, the level of adverse selection around the restatement announcements in NASDAQ is lower than that in NYSE-AMEX. The significance levels of t-statistics of all the abnormal trading activities after the announcements in NASDAQ are lower than those in NYSE-AMEX, especially in abnormal relative quoted spread and abnormal relative effective spread. The abnormal spreads increase significantly in day 0 and day +1, but beyond these days, they are rendered insignificant. In the NYSE-AMEX, the significant increase in abnormal spreads lasts longer (more than five days). Table 8 reports the cross-sectional regression results showing the impact of adverse selection, order processing, and inventory holding costs on the spreads during both nonevent and event trading. Unlike the NYSE-AMEX, we do not report any significant increase in adverse selection around the event window. None of the coefficients on the intercept, and shift dummy variables (PRE, DURING, POST) are statistically significant. The impact of order size on the spreads is not evident during the event window. The coefficient of the variable $DURING \times \Delta \ln(ORDERSIZE)$ is not significant for all the four measures of spread.

In summary, the univariate results indicate a significant increase in abnormal trading activities and adverse selection after the restatement announcements in the NASDAQ, which is similar to the evidence documented in the NYSE. However, it appears that the level of adverse selection in NASDAQ around the event window is less severe than that in NYSE-AMEX. Additionally, the significant increase in adverse selection around the event date is not documented in the cross sectional regression analysis, which controls for other components of spread.

V. Conclusions

In this study, we investigate how accounting restatement announcements affect the trading activities and information asymmetry in both quoted- driven NYSE-AMEX market and the order-driven NASDAQ market using a sample of restatement announcements from 1997 to 2005 collected from GAO Financial Statement Restatement Database. We conduct a univariate analysis of daily return, volume, number of transactions, average order size, volatility, and various measures of spreads for the restatement firms. We also conduct a cross sectional analysis of the spread relation with control variables documented in the literature that proxy for adverse selection cost, inventory holding cost and order processing cost to further examine the impact of trading activities on spreads during both non-event and event trading. In addition, we compare both univarite and cross sectional analyses of the restatement firms with those of the matching firms based on size and SIC code to account for other events unrelated to the restatement announcement, which may affect the trading activities.. We also perform similar analyses for NASDAQ restatements to examine the extent of the order-driven market reactions to the restatement announcement event compared with the quoted-driven market.

Our univariate tests demonstrate economically and significantly negative mean cumulative abnormal returns around the announcement dates. The restatements attributed to auditors are associated with more negative returns than the restatements attributed to management and the SEC. However, we do not find any significant difference between the abnormal returns of restatements related to revenues and expenses (core accounts) and restatements related to non-core accounts. In addition to abnormal returns, we document a significant increase in volume, number of transaction, average order size, volatility, and various measures of spreads after the restatement announcement indicating increased uncertainty and

adverse selection after the announcement. The abnormal return and trading metrics results suggest that investors believe that the restatements may diminish company prospects, and that the financial information provided by managers is less than reliable. Investors, therefore, are more likely to be skeptical about the reliability of the firm's past financial statements as well as the firm's future financial information. As a result, investors experience increased uncertainty, information asymmetry, and adverse selection, which are reflected in wider volume, volatility and bid-ask spreads.

In the cross sectional analysis, we observe a positive overall relation between spread and order size during periods of normal trading, which is consistent with the view expressed in Easley and O'Hara (1987) that large trades occur primarily due to private information and provide evidence on the presence of adverse selection. The relation between spread and order size during the restatement event period is also significantly positive implying an increase in adverse selection during the event window, which is consistent with the univariate analysis. In addition, in both univariate and cross sectional analyses, we do not document any significant increase in all trading metrics or increased negative abnormal returns for the matching firms around the announcement date. There is no evidence of increased order size during the event window. Therefore, the increased uncertainty, increased adverse selection, and increased negative market reactions after the restatement announcements should be attributed to the effect of restatement announcements only, not to other events that might have affected the restatement firms during the event periods.

We also provide evidence supporting the theoretical model of Kim and Verrecchia (1994, 1997) that information asymmetry is not just due to inside information but also due to the superior analysis of publically available data by skilled information processors. Disclosure of

information causes increased information asymmetry risk because some investors are able to make use of their superior information processing ability. Accordingly, spreads widen after the announcement rather than before it, which is consistent with our results.

Finally, we also document significant increase in market negative reaction, abnormal trading activities and adverse selection after the restatement announcements for NASDAQ, which is similar to the evidence documented for NYSE. However, the level of adverse selection in NASDAQ around the event date seems to be lower than that in NYSE-AMEX.

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Table 1: Descriptive statistics by Year, Industry, Reasons and Initiators

Panel A, B, and C report the distribution of sample companies by year, reasons, and initiators of restatement announcement as reported in GAO (2002, 2006) database. N indicates number of restatements, % indicates the percentage in the overall sample. Panel D reports the distribution by industry. Industry classification are defined using the following SIC codes as in Palmrose at el. (2004): Agriculture, mining & construction = 0-1999, Manufacturing = 2000-3999 (except codes assigned to Technology), Technology = 3570-3579 plus 7370-7379, Transportation = 4000-4799, Communications = 4800-4899, Utilities = 4900-4999, Wholesale/Retail = 5000-5999, Financial services = 6000-6999, services = 7000-8999 (except codes assigned for Technology). The total of restatement reasons and initiators are not equal to the total sample size due to some restatements having multiple reasons or initiators.

	NYSE-AMEX		NASDAQ	
	N	%	N	%
Panel A: Year of restatement announcement				
1997	23	2.5%	57	5.8%
1998	27	2.9%	64	6.5%
1999	56	6.1%	85	8.6%
2000	57	6.2%	105	10.6%
2001	86	9.3%	108	10.9%
2002	138	15.0%	132	13.3%
2003	129	14.0%	112	11.3%
2004	165	17.9%	121	12.2%
2005	240	26.1%	207	20.9%
Total	921	100.0%	991	100.0%
Panel B: Reasons of restatement announcement				
Acquisitions and mergers	49	4.3%	53	4.5%
Cost or expense	340	29.5%	324	27.7%
In process research and development	6	0.5%	28	2.4%
Other	104	9.0%	107	9.2%
Reclassification	86	7.5%	63	5.4%
Related-party transactions	30	2.6%	20	1.7%
Restructuring asset or inventory	165	14.3%	124	10.6%
Revenue recognition	259	22.5%	336	28.7%
Securities related	113	9.8%	114	9.8%
Total	1152	100.0%	1169	100.0%
Panel C: Initiators of restatement announcement				
Auditor	106	10.7%	118	11.4%
Company	546	55.2%	570	55.1%
SEC	100	10.1%	98	9.5%
Other/Unidentified	237	24.0%	248	24.0%
Total	989	100.0%	1034	100.0%
Panel D: Industry distribution of the sample companies				
Agriculture, mining & construction	74	8.0%	14	1.4%
Manufacturing	268	29.1%	279	28.2%
Technology	60	6.5%	208	21.0%
Transportation	21	2.3%	24	2.4%
Communication	31	3.4%	64	6.5%
Utilities	67	7.3%	12	1.2%
Wholesale and retail	136	14.8%	159	16.0%
Financial services	153	16.6%	122	12.3%
Services	111	12.1%	109	11.0%
Total	921	100%	991	100.0%

Table 2: Descriptive statistics- Restatement and Matching firms

This table provides the descriptive statistics for the restatement and matching firms. Financial statement and share price information are as at the end of the most recent month-end at least 30 days before the restatement announcement. Restatement firms and their matching firms must be traded on the same market (i.e., either NYSE-AMEX or NASDAQ). We choose the matching firms based on SIC codes and size. We select the matching firm closest in size (market capitalization at least 30 days before the announcement) within the same four-digit SIC code. If we are unable to find a match, we relax the four-digit to three-digit level and find the matching firm closest in size to the restatement firm. The sample restatement firms are from 1997-2005 collected from GAO (2002, 2006) database.

Panel A: NYSE-AMEX restatements

	# restatements	Median restatement	Median match	Mean restatement	Mean match
Share Price ($)	888	17.25	19.84	21.23	24.49
Shares outstanding (millions)	888	51.27	44.65	206.54	136.18
Market cap ($millions)	888	905.93	901.04	4795.17	4271.62
Book-to-market ratio	888	0.58	0.59	1.07	1.25
Beta	888	0.92	0.82	1.03	0.95

Panel B: NASDAQ restatements

	# restatements	Median restatement	Median match	Mean restatement	Mean match
Share Price ($)	956	8.95	9.60	13.72	14.27
Shares outstanding (millions)	956	17.50	15.07	45.65	31.72
Market cap ($millions)	956	138.07	130.50	753.95	575.12
Book-to-market ratio	956	0.50	0.48	0.79	0.90
Beta	956	1.21	1.13	1.42	1.38

Table 3: Mean Cumulative Abnormal return around the announcements by core/non-core reasons and by prompters for NYSE-AMEX firms.

The table shows the mean cumulative abnormal return around the announcements by core/non-core reasons and by prompters for a sample of NYSE-AMEX restatement firms from 1997-2005 collected from GAO (2002, 2006) database. Cumulative abnormal returns are based on a single-factor market model estimated from day –250 to day –30 for each sample firm, using the CRSP value-weighted index. Core restatements are the ones restated by reasons related to cost or expense and revenue recognition. For all other reasons, the restatements are non-core restatements. The prompters of the restatements can be management of company, auditors, SEC, and other parties.

Day	All	Core	Non-core	Company	Auditor	SEC	Other
-10	-0.11%	-0.06	-0.31	-0.06	-0.25	-0.64	-0.08
-9	-0.01%	-0.01	-0.10	0.26	-0.36	-0.49	-0.41
-8	-0.05%	-0.01	0.06	-0.04	-0.32	0.28	-0.08
-7	0.01%	0.05	-0.08	0.10	-0.19	0.41	-0.45
-6	0.04%	0.27	-0.17	-0.10	0.54	-0.45	0.33
-5	0.04%	-0.15	0.11	0.00	-0.05	0.20	0.10
-4	-0.11%	-0.15	-0.25	0.03	0.10	-0.95	-0.11
-3	-0.12%	-0.23	-0.15	-0.21	0.14	0.25	-0.16
-2	-0.31%***	-0.10	-0.57***	-0.35**	-0.22	-0.43	-0.13
-1	-0.19%*	-0.32**	-0.17	-0.22	-0.02	-0.18	-0.16
0	-1.86%***	-1.75***	-2.34***	-1.69***	-1.68***	-1.02***	-1.99***
1	-1.66%***	-2.01***	-1.83***	-1.75***	-3.15***	-1.20***	-1.21***
2	0.08%	0.33**	0.25	-0.07	1.66	-0.43	0.00
3	-0.03%	0.06	-0.08	-0.03	-0.23	-0.32	0.20
4	-0.21%	-0.11	-0.42	-0.12	-0.63	-0.51	-0.20
5	0.08%	-0.08	0.18	0.01	-0.15	0.58	0.18
(0,+1)	-3.50%***	-3.74***	-4.14***	-3.42***	-4.79***	-2.21***	-3.19***
N	901	588	536	532	103	97	234

*** Statistically significant at the 0.01 level.
** Statistically significant at the 0.05 level.
* Statistically significant at the 0.1 level.

Table 4: Average Daily Trading Activities around the restatement announcement for NYSE-AMEX firms.

This table reports the mean and median of average daily abnormal volume, abnormal transactions, abnormal order size, abnormal volatility, abnormal relative quoted spread, and abnormal relative effective spread for a sample of NYSE-AMEX restatement firms from 1997-2005 collected from GAO (2002, 2006) database. All variables are log-transformed before further computation. The normal trading period value is the average daily values over an estimation period, day -250 to day -30 relative to the restatement announcement date. Abnormal daily spreads (volume, number of transactions, order size, volatility) are computed by taking the daily value on a given day less the normal trading period value. The t-statistics in the parenthesis are reported for the mean while the p-values of the non-parametric Wilcoxon test in the squared bracket are reported for the median to examine whether the mean and median are statistically different from zero.

	Abnormal volume		Abnormal transactions		Abnormal order size	
Day	Mean	Median	Mean	Median	Mean	Median
-10	-1.85	-3.23	-0.93	-0.98	-1.09	-4.39
	(-0.69)	[0.19]	(-0.50)	[0.34]	(-0.67)	[0.03]
-9	1.51	0.44	0.99	1.13	0.39	-1.44
	(0.58)	[0.78]	(0.55)	[0.89]	(0.26)	[0.35]
-8	-0.10	-1.75	-0.09	-1.19	-0.29	-4.47
	(-0.04)	[0.73]	(-0.05)	[0.75]	(-0.13)	[0.31]
-7	-2.86	-2.02	-2.95	-3.58	-0.09	-2.03
	(-1.02)	[0.31]	(-1.58)	[0.03]	(-0.05)	[0.70]
-6	-1.48	-3.56	-1.94	-2.94	0.34	-1.77
	(-0.51)	[0.46]	(-1.00)	[0.09]	(0.20)	[0.94]
-5	-0.73	0.28	0.18	0.48	-1.05	-1.59
	(-0.27)	[0.87]	(0.09)	[0.79]	(-0.66)	[0.32]
-4	-0.80	-4.51	-0.48	-2.18	-0.41	-3.06
	(-0.29)	[0.31]	(-0.26)	[0.21]	(-0.25)	[0.34]
-3	-0.26	-0.02	-0.18	0.35	-0.08	-1.42
	(-0.09)	[0.81]	(-0.10)	[0.86]	(-0.05)	[0.47]
-2	1.40	-1.87	1.34	-0.67	0.05	-2.46
	(0.52)	[0.83]	(0.74)	[0.95]	(0.03)	[0.50]
-1	3.48	-2.51	0.19	-0.44	3.15	-2.42
	(1.27)	[0.58]	(0.10)	[0.99]	(1.90)*	[0.39]
0	46.50	33.68	27.96	18.21	18.90	14.63
	(13.14)***	[0.00]***	(11.98)***	[0.00]***	(10.46)***	[0.00]***
1	60.70	44.54	38.25	27.76	22.73	18.54
	(16.71)***	[0.00]***	(15.48)***	[0.00]***	(12.68)***	[0.00]***
2	36.11	26.96	23.19	17.18	12.89	9.18
	(10.98)***	[0.00]***	(10.25)***	[0.00]***	(7.51)***	[0.00]***
3	22.03	11.70	13.33	10.31	8.74	3.27
	(7.33)***	[0.00]***	(6.40)***	[0.00]***	(5.35)***	[0.00]***
4	19.70	11.74	12.04	8.93	7.68	3.47
	(6.81)***	[0.00]***	(6.22)***	[0.00]***	(4.34)***	[0.00]***
5	18.27	11.55	11.94	8.29	6.29	2.13
	(6.55)***	[0.00]***	(6.06)***	[0.00]***	(3.89)***	[0.00]***

Table 4: Average Daily Trading Activities around the restatement announcement for NYSE-AMEX firms (cont.)

	Abnormal volatility		Abnormal relative quoted spread		Abnormal relative effective spread	
Day	Mean	Median	Mean	Median	Mean	Median
-10	0.02	0.20	1.66	-0.25	2.18	-0.52
	(0.01)	[0.90]	(1.25)	[0.47]	(1.45)	[0.52]
-9	1.07	1.30	0.31	-0.21	0.78	0.39
	(0.63)	[0.31]	(0.23)	[0.70]	(0.56)	[0.74]
-8	0.88	-0.17	1.40	-0.52	1.01	0.59
	(0.62)	[0.65]	(1.07)	[0.35]	(0.75)	[0.61]
-7	2.29	1.25	0.41	-0.16	0.34	-0.13
	(1.51)	[0.22]	(0.29)	[0.61]	(0.24)	[0.79]
-6	0.09	-2.10	-1.13	-3.16	-1.06	-3.31
	(0.06)	[0.42]	(-0.82)	[0.22]	(-0.74)	[0.15]
-5	-0.87	-1.53	-0.67	-0.20	0.27	-1.89
	(-0.55)	[0.57]	(-0.48)	[0.86]	(0.19)	[0.56]
-4	2.06	-0.38	1.50	0.48	0.74	-0.39
	(1.40)	[0.26]	(1.10)	[0.29]	(0.54)	[0.85]
-3	2.91	0.97	0.25	-0.71	1.32	0.60
	(1.99)**	[0.08]*	(0.18)	[0.61]	(0.93)	[0.39]
-2	2.35	-0.70	1.47	0.36	2.63	0.39
	(1.69)*	[0.38]	(1.10)	[0.45]	(1.77)	[0.39]
-1	2.62	1.61	3.43	1.19	4.21	1.51
	(1.65)	[0.02]**	(2.53)**	[0.02]**	(2.79)**	[0.04]**
0	21.38	13.26	13.47	10.24	13.23	9.28
	(10.75)***	[0.00]***	(9.04)***	[0.00]***	(7.90)***	[0.00]***
1	21.82	14.92	11.29	7.97	12.67	8.07
	(12.61)***	[0.00]***	(8.17)***	[0.00]***	(8.01)***	[0.00]***
2	5.34	1.24	4.65	0.43	5.84	1.15
	(3.43)***	[0.00]***	(3.52)***	[0.02]**	(3.87)***	[0.02]**
3	5.96	1.96	3.22	-1.23	3.73	-0.81
	(4.15)***	[0.00]***	(2.32)**	[0.16]	(2.56)***	[0.24]
4	4.45	0.66	3.60	0.12	4.49	0.15
	(3.10)***	[0.04]**	(2.67)***	[0.08]*	(3.26)***	[0.05]**
5	4.08	1.18	4.08	0.98	4.61	1.68
	(2.68)***	[0.03]**	(2.99)***	[0.02]**	(3.27)***	[0.01]***

*** Statistically significant at the 0.01 level.
** Statistically significant at the 0.05 level.
* Statistically significant at the 0.1 level.

Table 5: Cross-Sectional Determinants of Changes in Spreads During Non-Event Trading and Around the Restatement Announcement for NYSE-AMEX firms

This table reports the OLS coefficients of the pooled time-series cross sectional regressions to analyze the determinants of changes in natural log of spread (quoted spread, effective spread, relative quoted spread, and relative effective spread) for a sample of NYSE-AMEX restatement firms from 1997-2005 collected from GAO (2002, 2006) database. Δln(price) is the change in natural log of mean price, Δln(volatility) is the change in natural log of volatility, Δln(ntrans) is the change in natural log of number of transactions, Δln(ordersize) is the change in natural log of order size. Pre, Post, During are the event period dummies corresponding to day -10 through day -1, day 0 through day 1, day 2 through day 10 (relative to the announcement date), Company, SEC, Auditor are the dummies for restatement initiators: company, SEC, and auditor, respectively. The data are stacked across firms and days from day -250 to day 250 and White (1980)'s method is used to correct for heteroscedasticity.

	Proportional effective spread			Relative quoted spread		
Variable	All	Core	Non-core	All	Core	Non-core
Constant	-0.0024	-0.0022	-0.0026	-0.0011	-0.0009	-0.0014
	(-1.65)	(-1.24)	(-1.15)	(-1.16)	(-0.70)	(-1.00)
Δln(price)	-0.8639	-0.8632	-0.8828	-0.8380	-0.8368	-0.8508
	(-28.55)***	(-23.22)***	(-19.97)***	(-36.07)***	(-26.8)***	(-29.27)***
Δln(volatility)	1.6098	21.0179	1.0380	1.4913	16.4673	0.9987
	(1.14)	(3.66)***	(0.86)	(1.30)	(4.30)***	(1.00)
Δln(ntrans)	0.0272	0.0230	0.0324	0.0015	0.0049	-0.0010
	(7.66)***	(6.08)***	(5.43)***	(1.01)	(2.40)***	(-0.49)
Δln(ordersize)	0.0477	0.0444	0.0507	0.0236	0.0273	0.0201
	(12.83)***	(11.37)***	(8.14)***	(17.89)***	(15.17)***	(10.45)***
Pre	0.0043	0.0022	0.0065	0.0016	0.0000	0.0033
	(1.06)	(0.40)	(1.11)	(0.43)	(0.00)	(0.62)
Post	-0.0040	-0.0051	-0.0026	-0.0082	-0.0077	-0.0084
	(-1.00)	(-0.92)	(-0.45)	(-2.27)**	(-1.55)	(-1.62)
During	0.0039	0.0031	0.0041	0.0100	0.0062	0.0135
	(0.35)	(0.25)	(0.22)	(1.16)	(0.57)	(1.00)
Pre*	-0.0033	0.0067	-0.0133	-0.0056	-0.0117	-0.0002
Δln(ordersize)	(-0.26)	(0.36)	(-0.82)	(-0.52)	(-0.71)	(-0.01)
During*	0.0436	0.0536	0.0331	0.0807	0.0717	0.0886
Δln(ordersize)	(3.07)***	(2.96)***	(1.09)	(4.59)***	(2.61)**	(3.99)***
Post*	-0.0125	0.0047	-0.0303	0.0091	0.0146	0.0033
Δln(ordersize)	(-1.13)	(0.32)	(-1.83)*	(1.00)	(1.20)	(0.24)
Company	-0.0019	0.0002	-0.0045	-0.0002	-0.0000	-0.0005
	(-1.05)	(0.12)	(-1.46)	(-0.23)	(-0.02)	(-0.33)
SEC	-0.0023	0.0009	-0.0052	0.0001	-0.0004	0.0004
	(-0.76)	(0.21)	(-1.18)	(0.03)	(-0.16)	(0.18)
Auditor	-0.0018	-0.0037	-0.0003	-0.0000	-0.0002	0.0002
	(-0.64)	(-0.84)	(-0.09)	(0.00)	(-0.11)	(0.09)
Adjusted R^2	0.0077	0.0096	0.0066	0.0129	0.0143	0.012
F-statistics	239.70***	157.77***	99.82***	405.68***	234.99***	180.61***
N	402626	210072	192554	402626	210072	192554

Table 5: Cross-Sectional Determinants of Changes in Spreads During Non-Event Trading and Around the Restatement Announcement for NYSE-AMEX firms (cont.)

	effective spread			quoted spread		
Variable	All	Core	Non-core	All	Core	Non-core
Constant	-0.0024	-0.0022	-0.0013	-0.0011	-0.0009	-0.0026
	(-1.64)	(-1.23)	(-0.95)	(-1.13)	(-0.70)	(-1.14)
Δln(price)	0.1429	0.1409	0.1040	0.1287	0.1393	0.1271
	(4.71)***	(3.82)***	(3.44)***	(5.31)***	(4.36)***	(2.82)***
Δln(volatility)	1.7142	21.2423	1.0301	1.5493	17.1661	1.1410
	(1.28)	(3.71)***	(0.92)	(1.19)	(4.19)***	(1.00)
Δln(ntrans)	0.0269	0.0228	-0.0014	0.0011	0.0046	0.0321
	(7.59)***	(6.02)***	(-0.65)	(0.77)	(2.25)**	(5.38)***
Δln(ordersize)	0.0475	0.0441	0.0202	0.0236	0.0271	0.0505
	(12.77)***	(11.31)***	(10.46)***	(17.79)***	(15.01)***	(8.11)***
Pre	0.0043	0.0022	0.0031	0.0016	0.0003	0.0065
	(1.06)	(0.40)	(0.58)	(0.44)	(0.06)	(1.11)
Post	-0.0041	-0.0051	-0.0085	-0.0082	-0.0077	-0.0027
	(-1.00)	(-0.91)	(-1.62)	(-2.25)**	(-1.52)	(-0.47)
During	0.0040	0.0030	0.0131	0.0098	0.0063	0.0045
	(0.36)	(0.24)	(0.76)	(0.98)	(0.58)	(0.24)
Pre*	-0.0030	0.0071	0.0001	-0.0052	-0.0114	-0.0132
Δln(ordersize)	(-0.24)	(0.38)	(0.01)	(-0.48)	(-0.68)	(-0.81)
During*	0.0436	0.0540	0.0802	0.0756	0.0700	0.0327
Δln(ordersize)	(3.07)***	(2.97)***	(3.48)***	(4.23)***	(2.54)**	(1.08)
Post*	-0.0124	0.0045	0.0015	0.0080	0.0142	-0.0299
Δln(ordersize)	(-1.12)	(0.30)	(0.10)	(0.87)	(1.15)	(-1.81)
Company	-0.0019	0.0002	-0.0006	-0.0003	-0.0000	-0.0045
	(-1.05)	(0.11)	(-0.36)	(-0.26)	(-0.02)	(-1.46)
SEC	-0.0023	0.0009	0.0004	0.0001	-0.0004	-0.0052
	(-0.75)	(0.22)	(0.15)	(0.01)	(-0.17)	(-1.17)
Auditor	-0.0019	-0.0037	0.0002	-0.0001	-0.0002	-0.0003
	(-0.65)	(-0.84)	(0.07)	(-0.01)	(-0.30)	(-0.09)
Adjusted R^2	0.0034	0.0039	0.0014	0.0020	0.0030	0.0033
F-statistics	105.02***	63.46***	22.43***	61.52***	49.09***	49.64***
N	402626	210072	192554	402626	210072	192554

*** Statistically significant at the 0.01 level.
** Statistically significant at the 0.05 level.
* Statistically significant at the 0.1 level.

Table 6: Cross-Sectional Determinants of Changes in Spreads During Non-event Trading and Around the Restatement Announcement for NYSE-AMEX Matching firms

This table reports the OLS coefficients of the pooled time-series cross sectional regressions to analyze the determinants of changes in natural log of spread (quoted spread, effective spread, relative quoted spread, and relative effective spread) for the matching firms of NYSE-AMEX restatement firms from 1997-2005 collected from GAO (2002, 2006) database. We select the matching firm closest in size (market capitalization at least 30 days before the announcement) within the same four-digit SIC code. If we are unable to find a match, we relax the four-digit to three-digit level and find the matching firm closest in size to the restatement firm. Δln(price) is the change in natural log of mean price, Δln(volatility) is the change in natural log of volatility, Δln(ntrans) is the change in natural log of number of transactions, Δln(ordersize) is the change in natural log of order size. Pre, Post, During are the event period dummies corresponding to day -10 through day -1, day 0 through day 1, day 2 through day 10 (relative to the announcement date), Company, SEC, Auditor are the dummies for restatement initiators: company, SEC, and auditor, respectively. The data are stacked across firms and days from day -250 to day 250 and White (1980)'s method is used to correct for heteroscedasticity

Variable	Proportional effective spread	Relative quoted spread	effective spread	quoted spread
Constant	-0.0041	-0.0014	-0.0041	-0.0015
	(-4.68)***	(-2.88)**	(-4.76)***	(-2.97)***
Δln(price)	-0.0177	-0.0178	0.0036	0.0033
	(-12.10)***	(-11.74)***	(4.02)***	(3.56)***
Δln(volatility)	-0.1875	-0.2194	0.0977	0.0625
	(-16.88)***	(-26.79)***	(9.71)***	(8.03)***
Δln(ntrans)	0.0156	-0.0132	0.0165	-0.0123
	(4.18)***	(-9.09)***	(4.41)***	(-8.54)***
Δln(ordersize)	0.0418	0.0152	0.0403	0.0139
	(12.98)***	(12.40)***	(12.54)***	(11.37)***
Pre	0.0029	-0.0009	0.0029	-0.0009
	(0.68)	(-0.24)	(0.68)	(-0.26)
Post	-0.0026	-0.0012	-0.0028	-0.0015
	(-0.42)	(-0.31)	(-0.46)	(-0.39)
During	0.0049	0.0079	0.0039	0.0065
	(0.57)	(0.98)	(0.47)	(0.83)
Pre*	-0.0026	0.0113	-0.0024	0.0119
Δln(ordersize)	(-0.23)	(1.35)	(-0.22)	(1.43)
During*	-0.0056	-0.0286	0.0027	-0.0198
Δln(ordersize)	(-0.20)	(-1.02)	(0.11)	(-0.89)
Post*	0.0099	-0.0044	0.0100	-0.0044
Δln(ordersize)	(0.77)	(-0.48)	(0.78)	(-0.49)
Adjusted R^2	0.0030	0.0036	0.0021	0.0009
F-statistics	123.71***	145.41***	85.16***	36.81***
N	406270	406270	406270	406270

*** Statistically significant at the 0.01 level.
** Statistically significant at the 0.05 level.
* Statistically significant at the 0.1 level.

Table 7: Average Daily Abnormal Trading Activities around the Restatement Announcement for NASDAQ firms.

This table reports the average daily abnormal volume, abnormal transactions, abnormal order size, abnormal volatility, abnormal relative quoted spread, and abnormal relative effective spread for a sample of NASDAQ restatement firms from 1997-2005 collected from GAO (2002, 2006) database. All variables are log-transformed before further computation. The normal trading period value is the average daily values over an estimation period, day -250 to day -30 relative to the restatement announcement date. Abnormal daily spreads (volume, number of transactions, order size, volatility) are computed by taking the daily value on a given day less the normal trading period value. The t-statistics are in the parenthesis.

Day	Return	Volume	No. of transaction	Order Size	Volatility	Relative quoted spread	Relative effective spread
-10	-0.31%	0.03	0.01	0.02	0.01	-0.05	-0.04
	(-1.60)	(0.74)	(0.46)	(1.06)	(0.79)	(-1.55)	(-0.87)
-9	-0.11%	-0.03	-0.02	-0.01	0.04	-0.04	-0.05
	(-0.58)	(-0.82)	(-0.74)	(-0.62)	(1.97)**	(-1.43)	(-0.86)
-8	-0.2%	-0.06	-0.03	-0.03	0.02	-0.02	-0.03
	(-1.01)	(-1.81)*	(-0.96)	(-1.81)	(1.28)	(-0.82)	(-0.52)
-7	-0.33%	-0.10	-0.04	-0.06	0.01	-0.00	0.04
	(-1.70)	(-2.89)**	(-1.40)	(-3.76)	(0.49)	(-0.15)	(0.65)
-6	-0.04%	-0.06	-0.04	-0.02	0.04	0.04	-0.02
	(-0.23)	(-1.76)	(-1.57)	(-1.10)	(2.27)**	(1.39)	(-0.28)
-5	-0.48%	-0.09	-0.06	-0.03	0.05	0.03	0.11
	(-2.49)**	(-2.47)**	(-2.27)**	(-2.08)	(2.57)**	(0.86)	(1.93)
-4	-0.38%	-0.05	-0.03	-0.01	0.06	0.04	0.03
	(-1.98)**	(-1.31)	(-0.88)	(-0.97)	(3.32)***	(1.24)	(0.60)
-3	-0.64%	-0.01	0.01	-0.02	0.05	0.01	0.02
	(-3.53)***	(-0.30)	(0.37)	(-1.27)	(2.69)**	(0.37)	(0.44)
-2	-0.19%	-0.00	0.02	-0.01	0.06	-0.00	-0.02
	(-0.98)	(-0.05)	(0.54)	(-0.84)	(3.11)***	(-0.15)	(-0.43)
-1	-0.33%	0.03	0.04	-0.00	0.07	0.01	0.03
	(-1.73)*	(1.01)	(1.44)	(-0.16)	(3.84)***	(0.18)	(0.49)
0	-2.55%	0.51	0.44	0.08	0.19	0.09	0.19
	(-13.31)***	(11.91)***	(12.09)***	(4.74)***	(9.81)***	(3.01)***	(3.30)***
1	-3.14%	0.73	0.61	0.13	0.23	0.08	0.16
	(-16.36)***	(16.42)***	(16.44)***	(7.87)***	(9.09)***	(2.70)**	(2.92)***
2	-0.4%	0.39	0.33	0.07	0.09	0.01	0.01
	(-2.09)**	(10.33)***	(10.53)***	(4.17)***	(4.76)***	(0.38)	(0.21)
3	0.59%	0.22	0.17	0.04	0.07	0.02	-0.01
	(3.09)***	(6.05)***	(6.15)***	(2.40)**	(3.45)***	(0.51)	(-0.33)
4	-0.11%	0.10	0.08	0.01	0.07	0.03	0.02
	(-0.57)	(2.74)***	(2.69)***	(0.40)	(3.48)***	(1.02)	(0.34)
5	0.06%	0.10	0.09	0.02	0.06	0.04	0.01
	(0.30)	(2.89)***	(3.43)***	(1.11)	(2.98)***	(1.23)	(0.09)

*** Statistically significant at the 0.01 level.

** Statistically significant at the 0.05 level.

* Statistically significant at the 0.1 level.

Table 8: Cross-Sectional Determinants of Changes in Spreads During Non-event Trading and Around the Restatement Announcement for NASDAQ Restatement Firms.

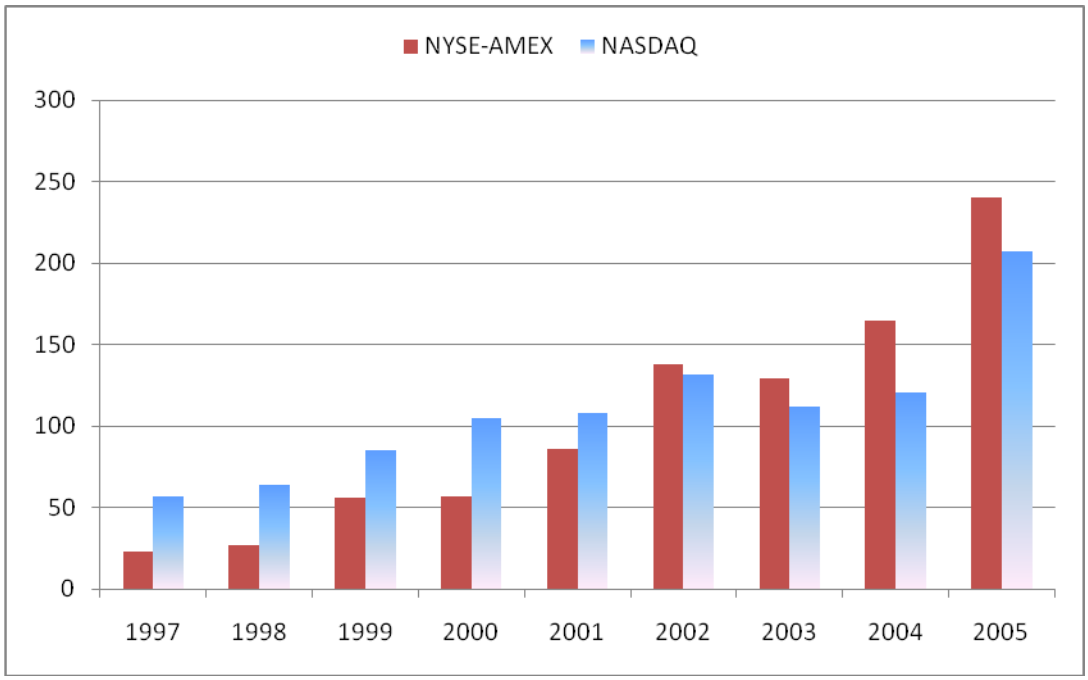
This table reports the OLS coefficients of the pooled time-series cross sectional regressions to analyze the determinants of changes in natural log of spread (quoted spread, effective spread, relative quoted spread, and relative effective spread) for a sample of NASDAQ restatement firms from 1997-2005 collected from GAO (2002, 2006) database. Δln(price) is the change in natural log of mean price, Δln(volatility) is the change in natural log of volatility, Δln(ntrans) is the change in natural log of number of transactions, Δln(ordersize) is the change in natural log of order size. Pre, Post, During are the event period dummies corresponding to day -10 through day -1, day 0 through day 1, day 2 through day 10 (relative to the announcement date), Company, SEC, Auditor are the dummies for restatement initiators: company, SEC, and auditor, respectively. The data are stacked across firms and days from day -250 to day 250 and White (1980)'s method is used to correct for heteroscedasticity.

Variable	Proportional effective spread	Relative quoted spread	effective spread	quoted spread
Constant	-0.0003	-0.0006	-0.0002	-0.0001
	(-0.05)	(-0.21)	(-0.05)	(-0.02)
Δln(price)	-0.5410	-0.7389	0.4661	0.4775
	(-11.86)***	(-28.39)***	(10.21)***	(10.93)***
Δln(volatility)	70.6613	44.4524	71.1759	58.3846
	(8.20)***	(8.95)***	(8.20)***	(7.80)***
Δln(ntrans)	0.2831	0.0599	0.2826	0.2362
	(53.09)***	(23.98)***	(52.99)***	(46.57)***
Δln(ordersize)	-0.0882	-0.0474	-0.0880	-0.0596
	(-13.95)***	(-15.45)***	(-13.91)***	(-9.91)***
Pre	0.0065	-0.0010	0.0064	0.0030
	(0.33)	(-0.10)	(0.33)	(0.16)
Post	0.0057	-0.0047	0.0059	0.0052
	(0.28)	(-0.47)	(0.29)	(0.27)
During	0.0037	0.0307	0.0037	0.0046
	(0.08)	(1.36)	(0.08)	(0.10)
Pre*	-0.0355	0.0225	-0.0358	-0.0176
Δln(ordersize)	(-0.82)	(1.04)	(-0.83)	(-0.43)
During*	0.0065	-0.0136	0.0062	-0.0053
Δln(ordersize)	(0.06)	(-0.27)	(0.06)	(-0.05)
Post*	-0.0393	-0.0277	-0.0390	-0.0437
Δln(ordersize)	(-0.89)	(-1.26)	(-0.88)	(-1.03)
Company	-0.0009	-0.0005	-0.0009	-0.0008
	(-0.14)	(-0.16)	(-0.14)	(-0.14)
SEC	-0.0001	-0.0001	-0.0001	-0.0002
	(-0.02)	(-0.03)	(-0.02)	(-0.04)
Auditor	-0.0005	0.0002	-0.0005	-0.0003
	(-0.05)	(0.05)	(-0.05)	(-0.04)
Adjusted R^2	0.0125	0.0047	0.0127	0.0098
F-statistics	377.71***	190.94***	381.25***	295.12***
N	386484	386484	386484	386484

*** Statistically significant at the 0.01 level.
** Statistically significant at the 0.05 level.
* Statistically significant at the 0.1 level.

Figure 1: Distributions of restatement firms in NYSE-AMEX and NASDAQ by year, industry, reasons, and initiators

The figures show the distribution of the restatement firms in NYSE-AMEX and NASDAQ by year, industry, reasons and initiators as reported in GAO (2002, 2006) database. Industry classification are defined using the following SIC codes as in Palmrose at el. (2004): Agriculture, mining & construction = 0-1999, Manufacturing = 2000-3999 (except codes assigned to Technology), Technology = 3570-3579 plus 7370-7379, Transportation = 4000-4799, Communications = 4800-4899, Utilities = 4900-4999, Wholesale/Retail = 5000-5999, Financial services = 6000-6999, services = 7000-8999 (except codes assigned for Technology). The total of restatement reasons and initiators are not equal to the total sample size due to some restatements having multiple reasons or initiators



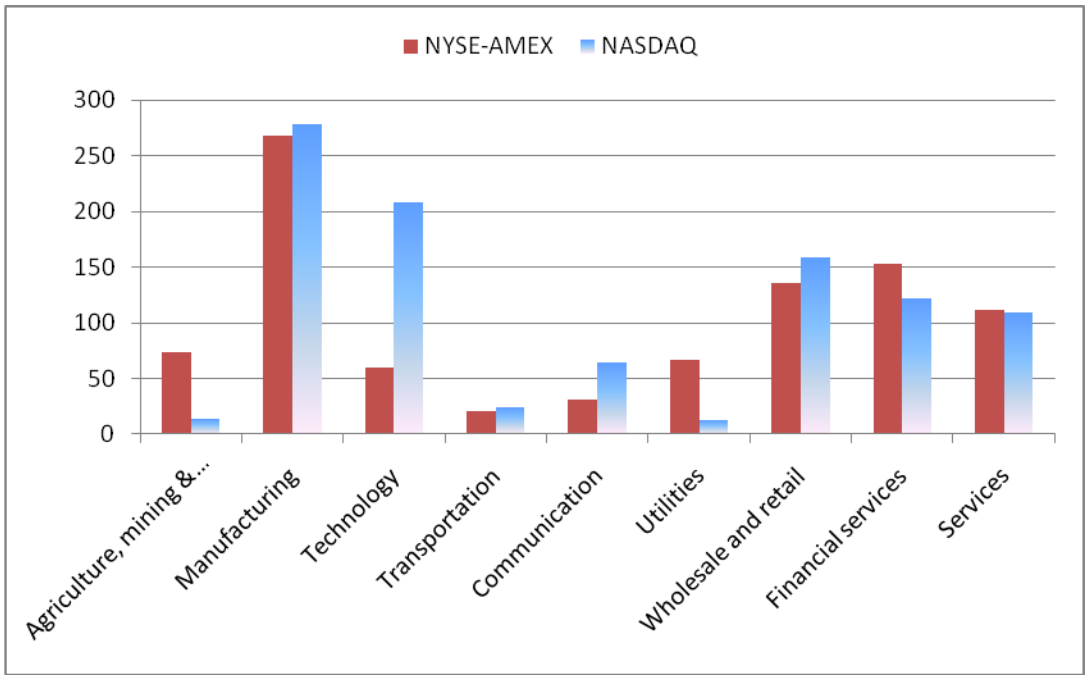
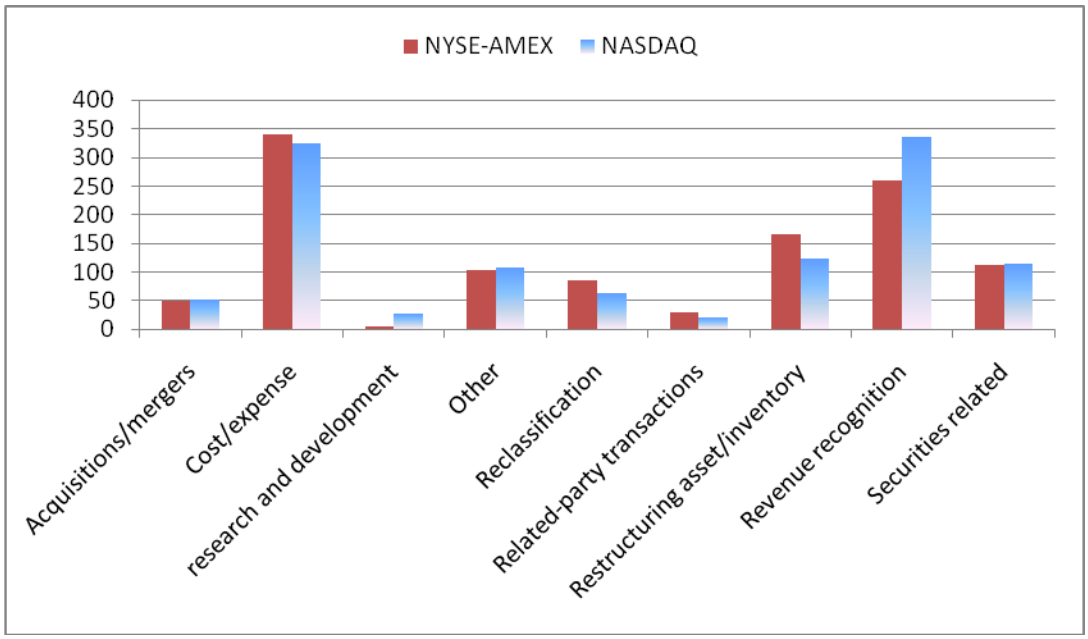


Figure 1: Distributions of restatement firms in NYSE-AMEX and NASDAQ by year, industry, reasons, and initiators (cont.)



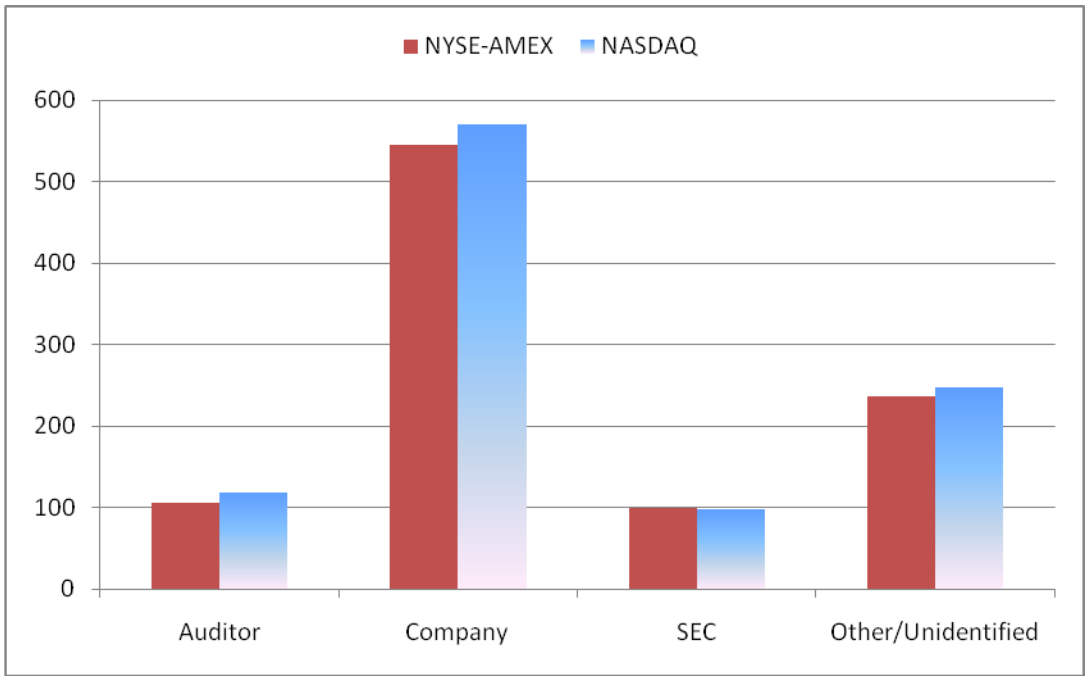


Figure 2: Abnormal Trading Activites Around the Restatement Announcement for NYSE-AMEX firms

These figures report the average daily abnormal volume, abnormal transactions, abnormal order size, abnormal volatility, abnormal relative quoted spread, abnormal relative effective spread, and abnormal return for a sample of NYSE-AMEX restatement and matching firms from 1997-2005 collected from GAO (2002, 2006) database. All variables are log-transformed before further computation. The normal trading period value is the average daily values over an estimation period, day -250 to day -30 relative to the restatement announcement date. Abnormal daily spreads (volume, number of transactions, order size, volatility) are computed by taking the daily value on a given day less the normal trading period value. Abnormal returns are based on a single-factor market model estimated from day –250 to day –30 for each sample firm, using the CRSP value-weighted index.

Figure A: Abnormal Volume

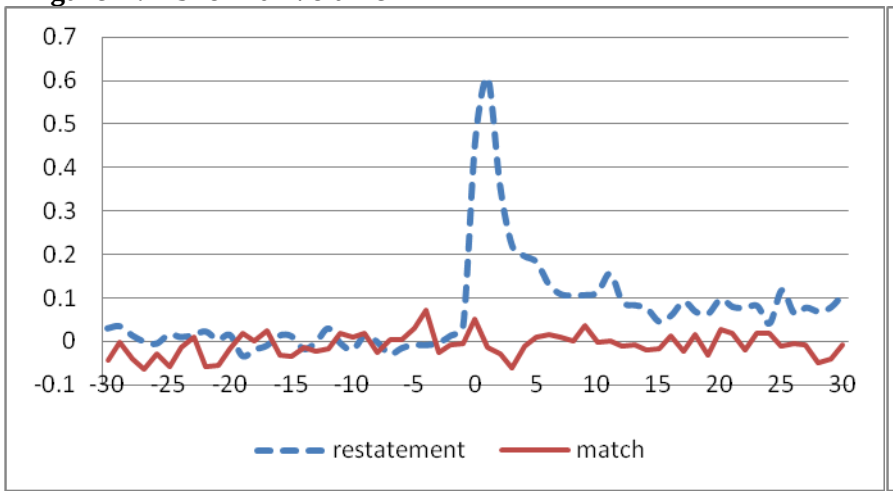


Figure B: Abnormal Number of Transactions

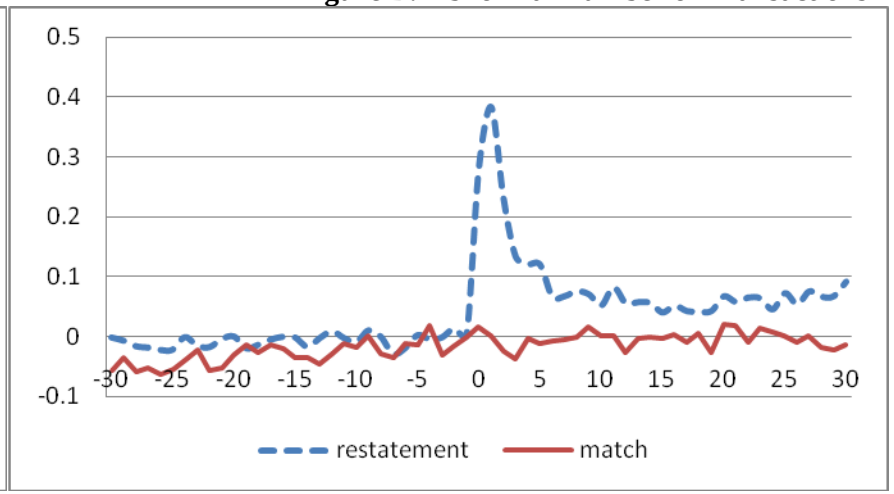


Figure C: Abnormal Order Size

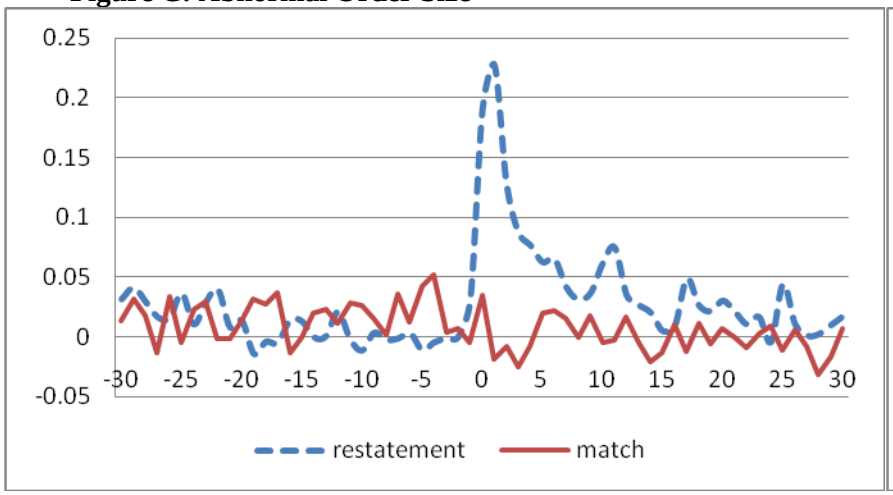


Figure D: Abnormal Volatility

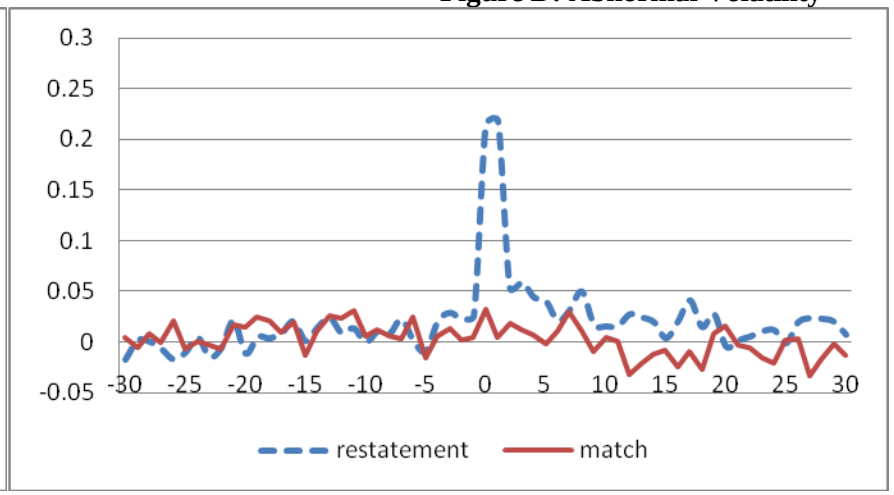


Figure E: Abnormal Relative Quoted Spead

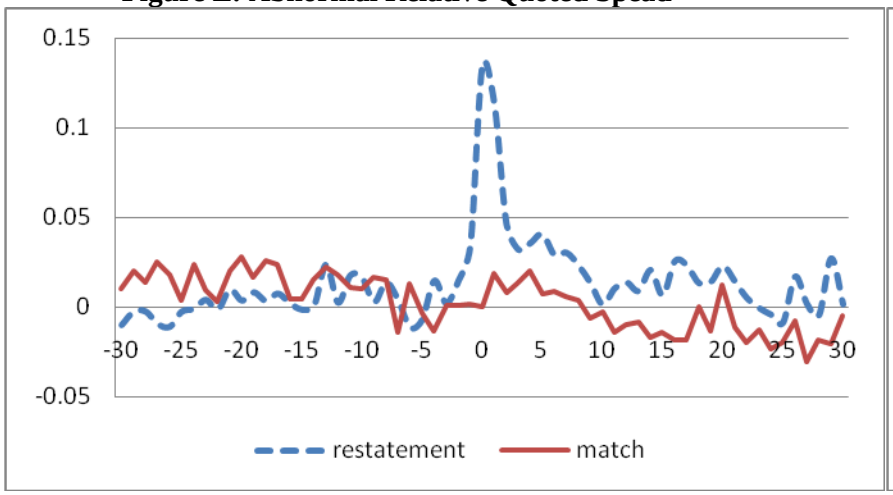


Figure F: Abnormal Relative Effective Spead

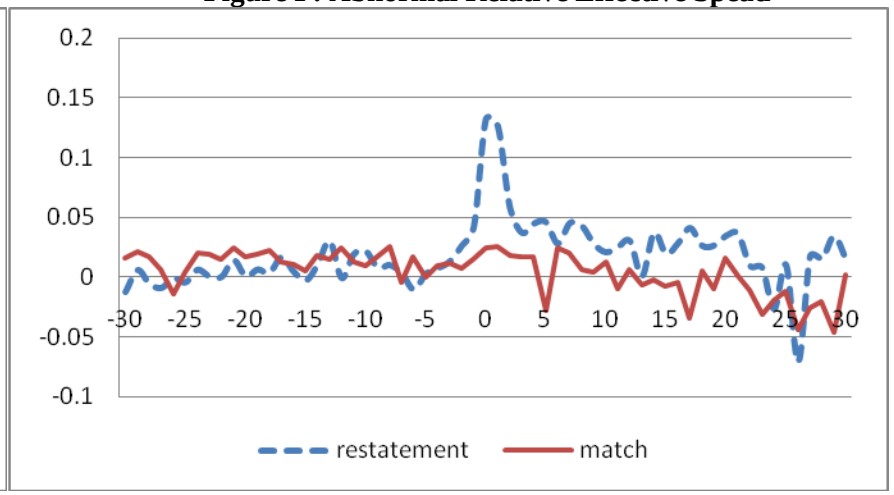


Figure G: Abnormal return

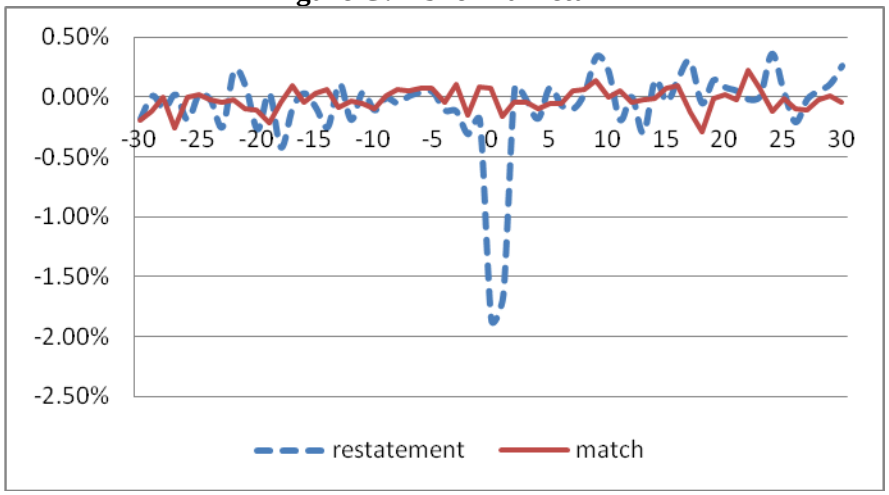


Figure 3: Abnormal Trading Activites Around the Restatement Announcement by core/non-core reasons for NYSE-AMEX firms

These figures report the average daily abnormal volume, abnormal transactions, abnormal order size, abnormal volatility, abnormal relative quoted spread, abnormal relative effective spread, and abnormal return for a sample of NYSE-AMEX core and non-core restatements from 1997-2005 collected from GAO (2002, 2006) database. All variables are log-transformed before further computation. The normal trading period value is the average daily values over an estimation period, day -250 to day -30 relative to the restatement announcement date. Abnormal daily spreads (volume, number of transactions, order size, volatility) are computed by taking the daily value on a given day less the normal trading period value. Abnormal returns are based on a single-factor market model estimated from day –250 to day –30 for each sample firm, using the CRSP value-weighted index

Figure A: Abnormal Volume

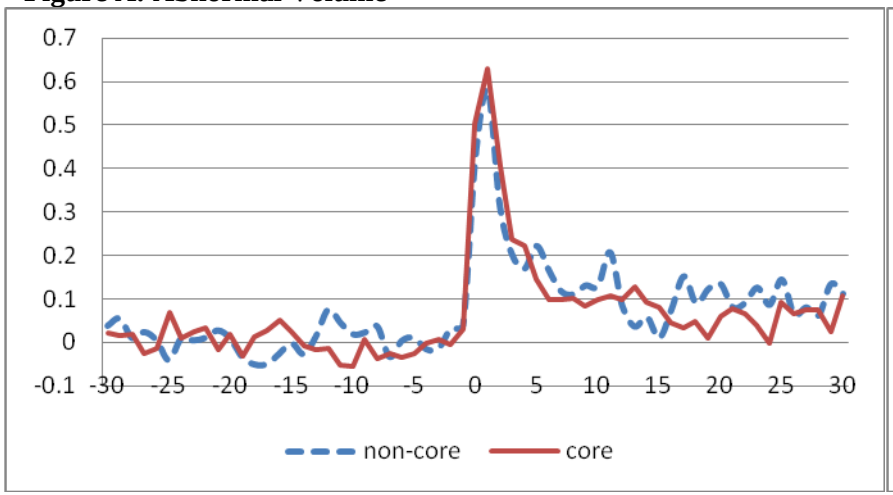


Figure B: Abnormal Number of Transactions

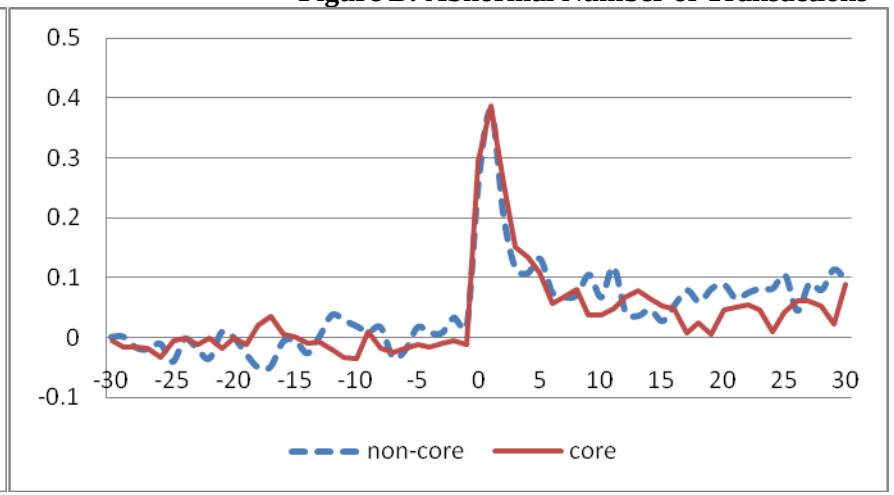


Figure C: Abnormal Order Size

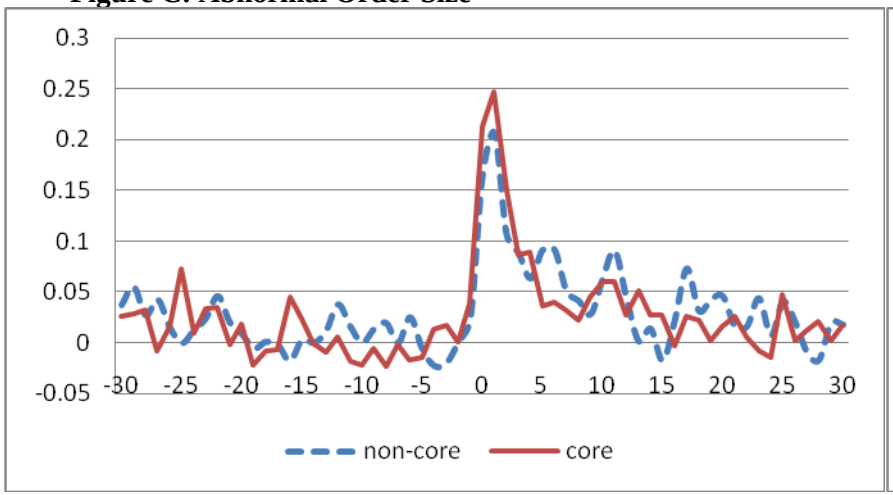


Figure D: Abnormal Volatility

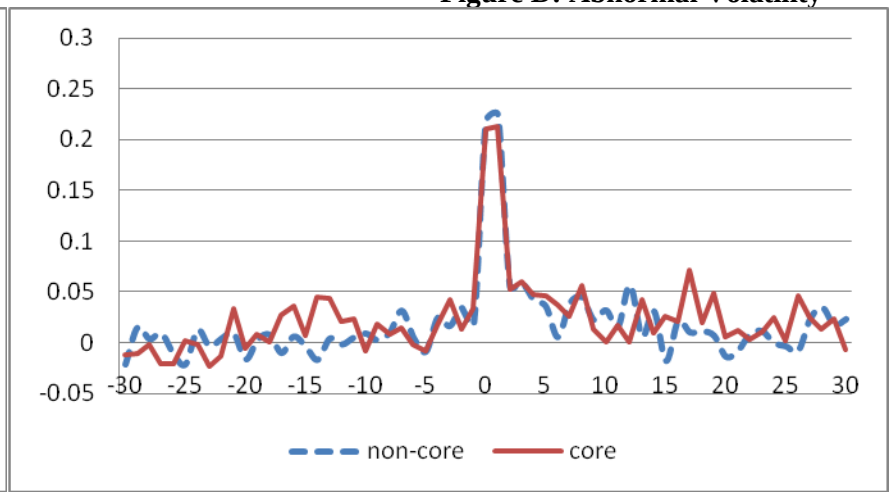


Figure E: Abnormal Relative Quoted Spead

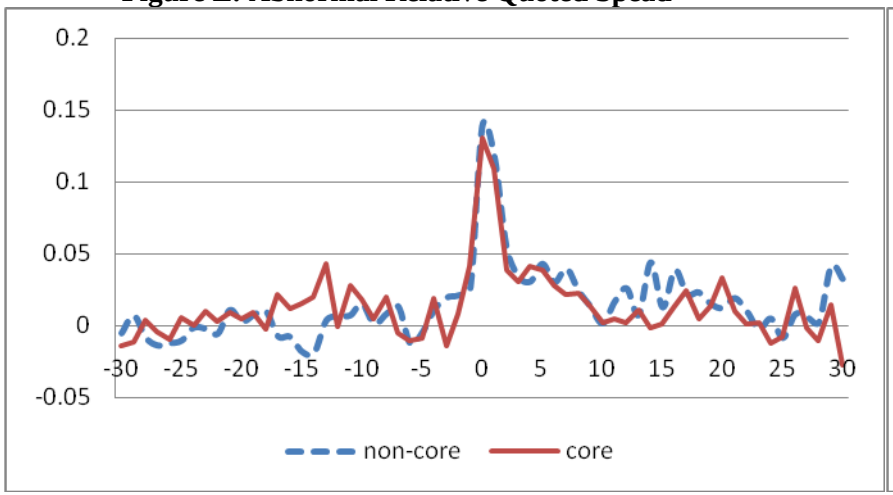


Figure F: Abnormal Relative Effective Spead

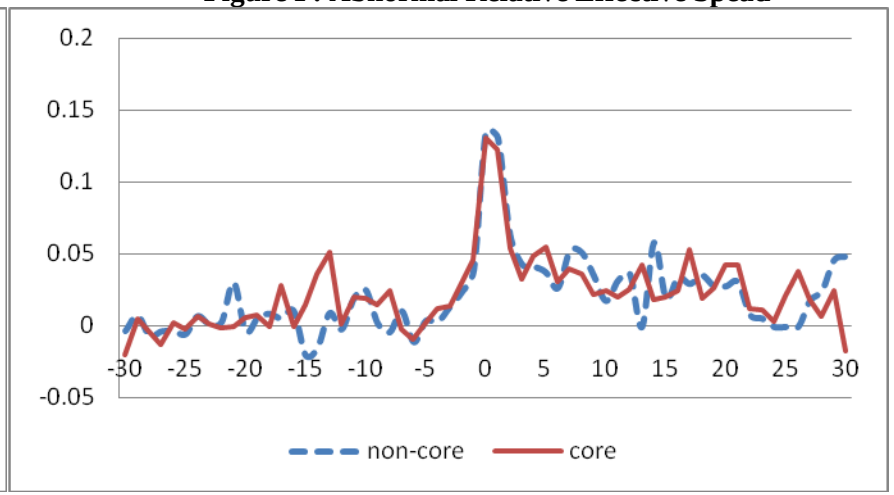


Figure G: Abnormal Return

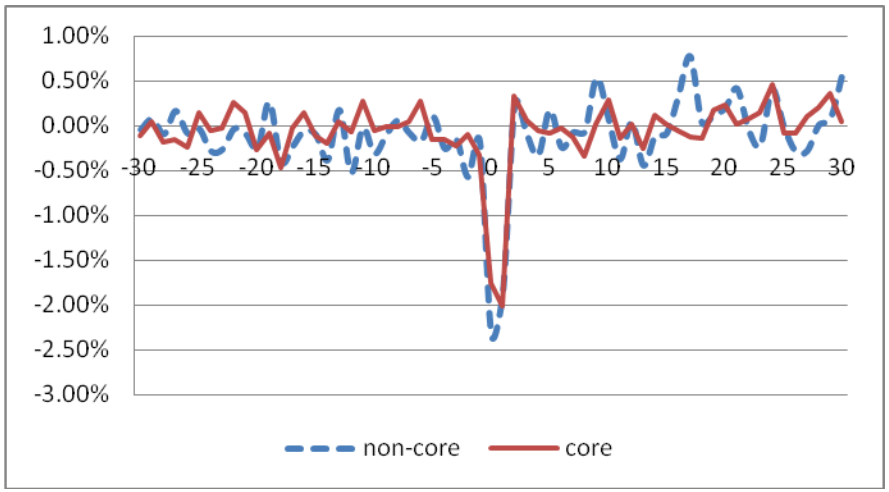


Figure 4: Abnormal Trading Activites Around the Restatement Announcement by Initiators for NYSE-AMEX firms

These figures report the average daily abnormal volume, abnormal transactions, abnormal order size, abnormal volatility, abnormal relative quoted spread, abnormal relative effective spread, and abnormal return for a sample of NYSE-AMEX restatements by initiators from 1997-2005 collected from GAO (2002, 2006) database. All variables are log-transformed before further computation. The normal trading period value is the average daily values over an estimation period, day -250 to day -30 relative to the restatement announcement date. Abnormal daily spreads (volume, number of transactions, order size, volatility) are computed by taking the daily value on a given day less the normal trading period value. Abnormal returns are based on a single-factor market model estimated from day –250 to day –30 for each sample firm, using the CRSP value-weighted index

Figure A: Abnormal Volume

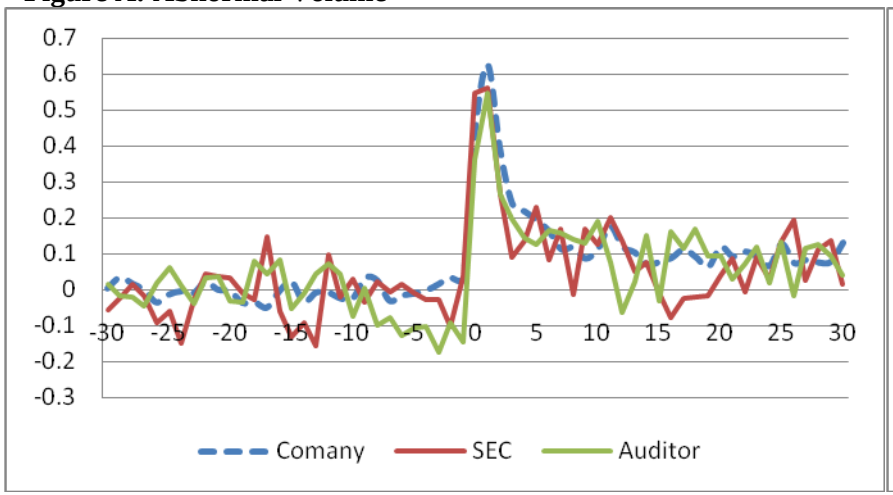


Figure B: Abnormal Number of Transactions

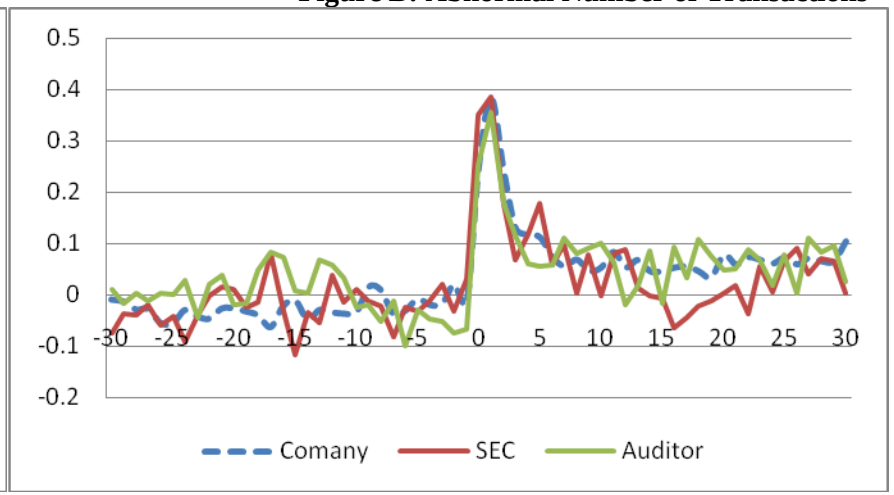


Figure C: Abnormal Order Size

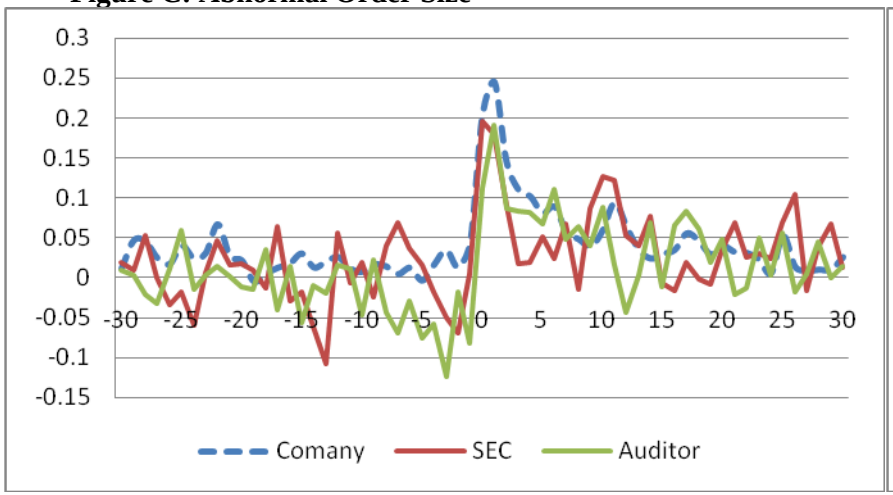


Figure D: Abnormal Volatility

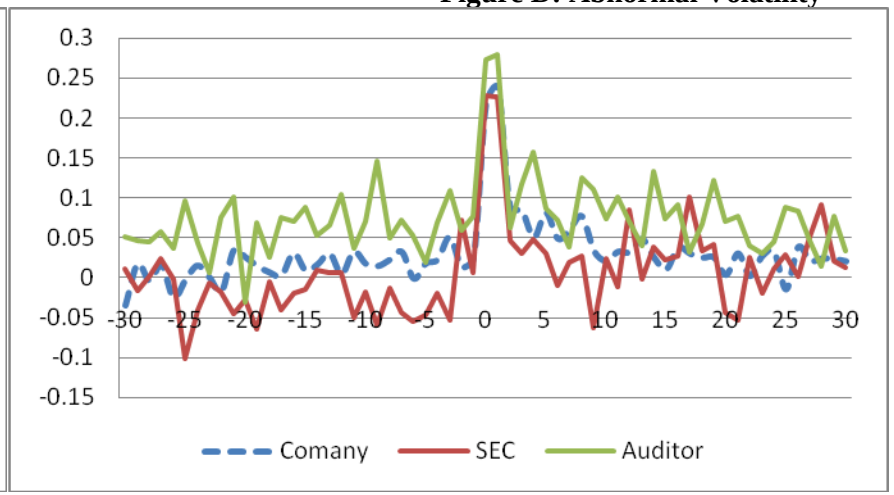


Figure E: Abnormal Relative Quoted Spead

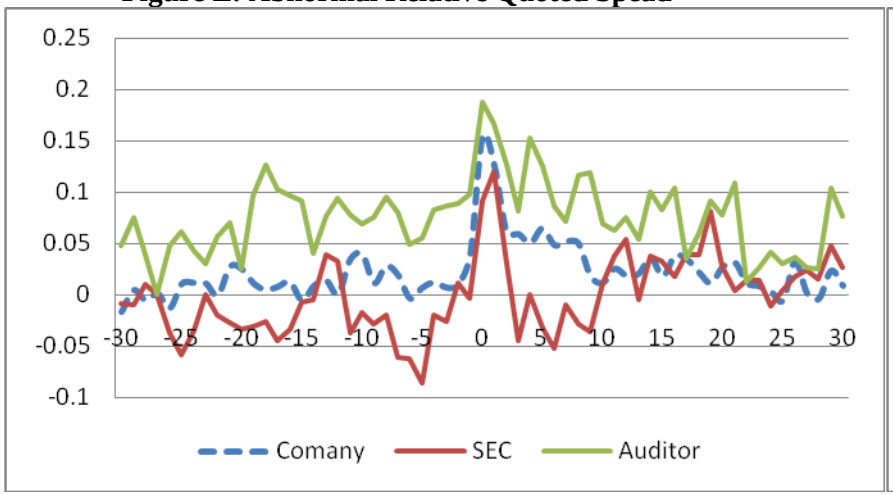


Figure F: Abnormal Relative Effective Spead

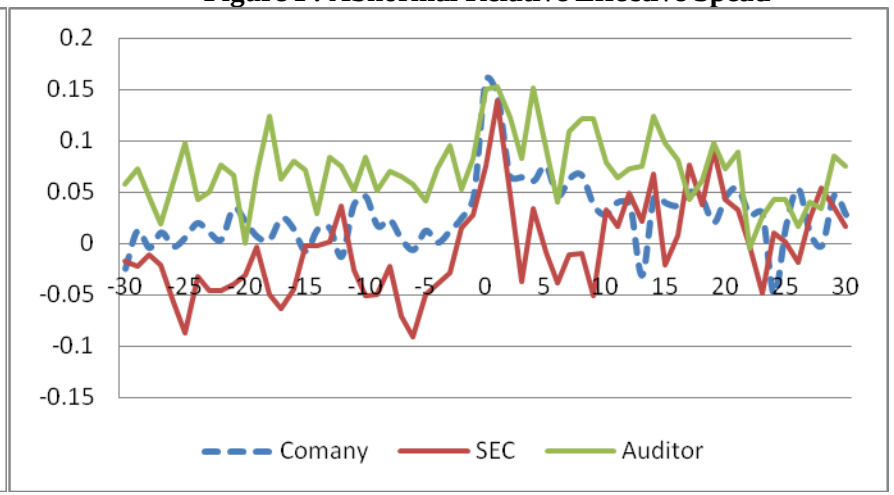


Figure G: Abnormal Return

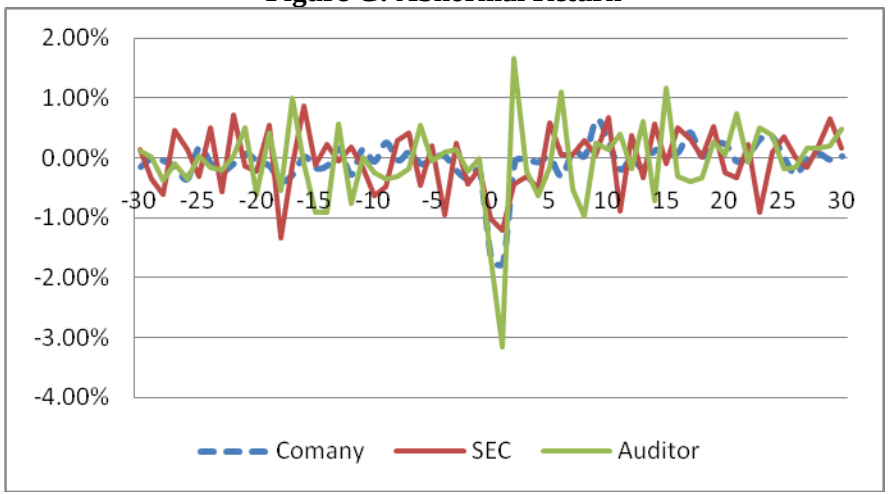


Figure 5: Abnormal Trading Activites Around the Restatement Announcement for NASDAQ firms

These figures report the average daily abnormal volume, abnormal transactions, abnormal order size, abnormal volatility, abnormal relative quoted spread, abnormal relative effective spread, and abnormal return for a sample of NASDAQ restatement and matching firms from 1997-2005 collected from GAO (2002, 2006) database. All variables are log-transformed before further computation. The normal trading period value is the average daily values over an estimation period, day -250 to day -30 relative to the restatement announcement date. Abnormal daily spreads (volume, number of transactions, order size, volatility) are computed by taking the daily value on a given day less the normal trading period value. Abnormal returns are based on a single-factor market model estimated from day –250 to day –30 for each sample firm, using the CRSP value-weighted index.

Figure A: Abnormal Volume

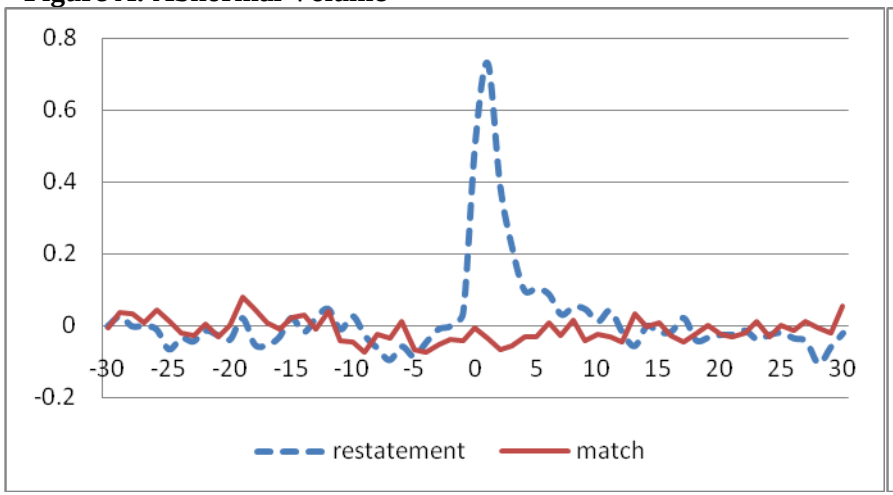


Figure B: Abnormal Number of Transactions

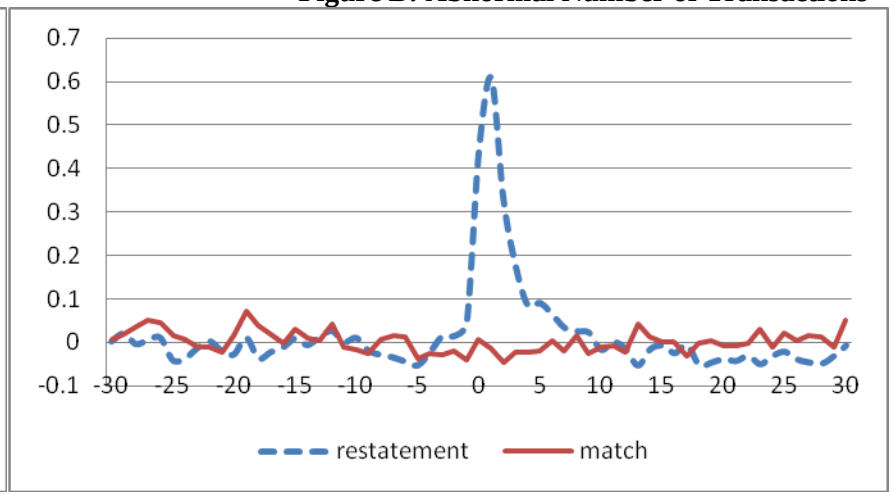


Figure C: Abnormal Order Size

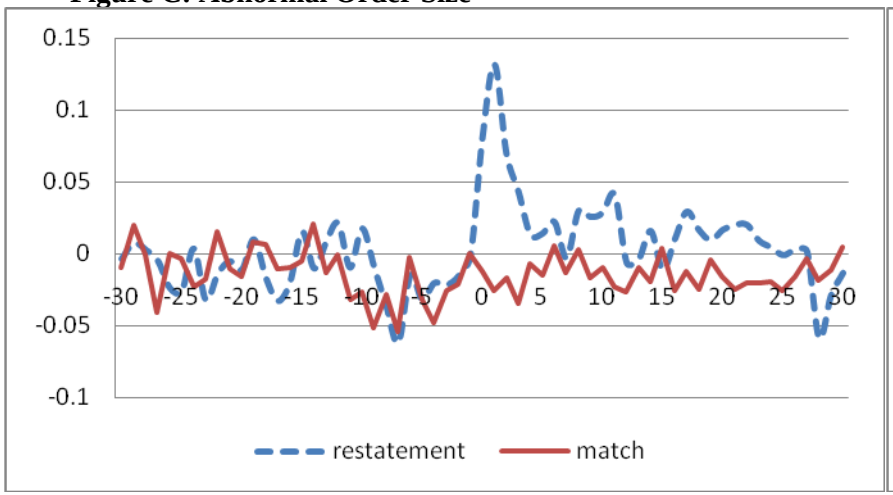


Figure D: Abnormal Volatility

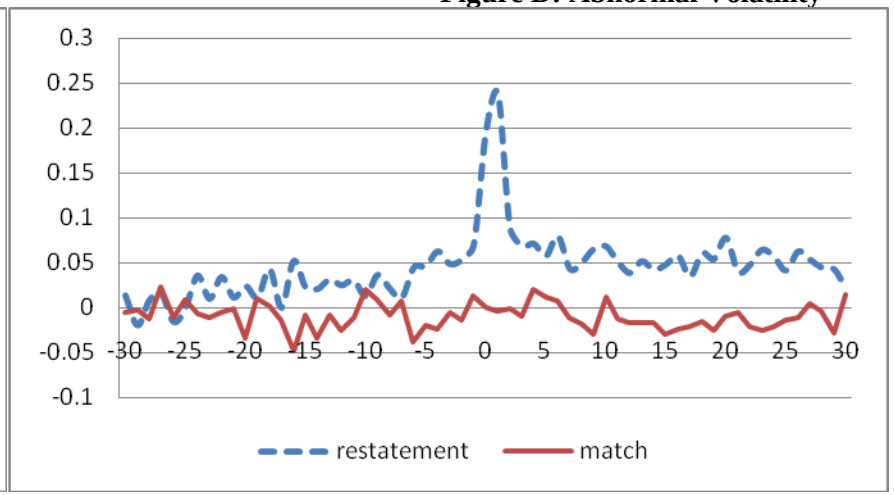


Figure E: Abnormal Relative Quoted Spead

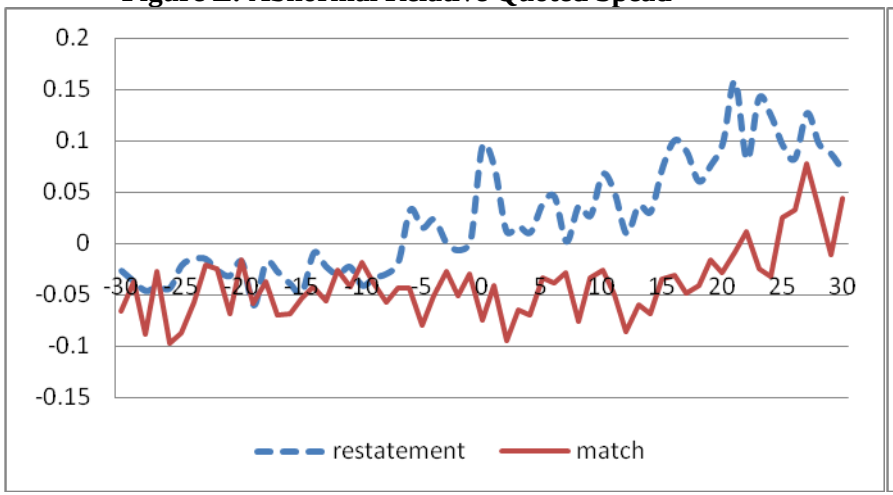


Figure F: Abnormal Relative Effective Spead

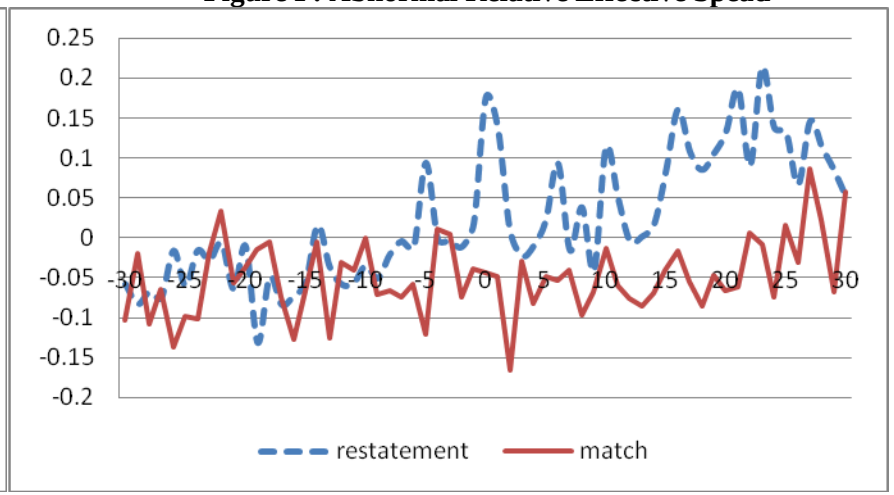


Figure G: Abnormal Return