IMPACT OF RESTATEMENT OF EARNINGS ON TRADING METRICS

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This study uses a more recent sample of matched restating firms from 1997 to 2002 to investigate the microstructure impact on a broad spectrum of key trading metrics including return, volume, and particularly the spread for stocks of the restating firms. Daily spreads of firms in the sample are examined around the restatement announcement dates in order to test for evidence of increased adverse selection. We also investigate the effect of restatement announcements on measures of trading activity and on the relation of these measures to the bid-ask spread. We find that restatement produce substantial change in volume and spread after the announcement. Specifically, spread increases dramatically at day 0 and day 1 (relative to the announcement day), and persistently go back the normal level after that. Significant increases in trading volume begin at the announcement date and go back the normal level after about 10 trading days. This is consistent with the models of Kyle (1985), Easley and O'Hara (1982) and Kim and Verrecchia (1991a, 1991b) in that increased information asymmetry at announcement dates should result in higher trading volumes as well as increased spreads. We also find that announcements produce negative abnormal returns. We also postulate a cross sectional model in which spread is a function of normal trading volume, unusual trading volume, and return variability. As predicted by the inventory control model, we find that spread is negatively correlated to trading volume but positively correlated to return variability.

I. Introduction

Restatement of financial statements and its consequences are becoming an important issue among the investors, corporate management, regulators, and auditing firms, particularly in the aftermath of the Sarbanes-Oxley Act of 2002. Investors and regulators are concerned over restatements to correct non-GAAP accounting in previously issued financial statements. For example, the former SEC Chairman testified before a Senate Subcommittee that, "in recent years, countless investors have suffered significant losses as market capitalization have dropped by billions of dollars due to restatements of audited financial statements" (Levitt, 2000). While dramatic declines in market values do occur, the research on the impact of such restatements, while increasing, is still rather limited. This paper studies how financial statement restatement announcements affect the trading activity in the stock market using a sample of restatement

announcements from 1997 to 2002 collected from GAO-03395R Financial Statement Restatement Database.[1]

There has been a recent upsurge in interest in issues concerning restatement. Palmrose, Richardson and Scholz (2004) using a sample of 403 restatements from 1995 to 1999 showed that stock market reaction depended on the characteristics of the restatement. Usually announcements resulted in negative abnormal returns for income decreasing restatements, dispersion increased, and there was no effect on bid-ask spread. 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 Pensrose and Scholz (2004) and the tax consequences are examined by Erickson, Hanlon, and Maydew (2004). The effect on expectations of future earnings and on cost of capital are studied by Hribar and Jenkins (2004). Griffin (2003) studied the response of analysts, insiders, short sellers and institutions to restatements.

This study uses a more recent sample from 1997 to 2002 to investigate the microstructure impact on a broader spectrum of key trading metrics including return, volume, and particularly the spread for stocks of the restating firms. Daily spreads of firms in the sample are examined around the restatement announcement dates in order to test for evidence of increased adverse selection. We also investigate the effect of restatement announcements on measures of trading activity and on the relation of these measures to the bid-ask spread.

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

There are two principal theories that explain the bid-ask spread: (1) asymmetric information model and (2) inventory control model. In asymmetric 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), Easley and O'Hara (1987), Glosten and Milgrom (1985) all argue that if marker 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. These studies suggest a positive relationship between spreads and unusually high trading volume, since dealers interpret an unusually high volume as a sign of an increased number of informed traders and widen their spreads accordingly.

These relationships should be particular evident around the announcement dates since these time would present an opportunity for information to be asymmetrically distributed. 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 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.

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 inventory control model, risk-averse market makers have a desired (optimal) inventory position. To maintain this optimal inventory level, the market makers are facing 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 wider 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 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 trading volume and spread.

Using a sample of 182 matched restatement announcements from companies trading in NYSE and AMEX, we first examine the time series of changes in spread and trading volume, and return around the announcement date. We do not document any substantial change in trading volume as well as in spread prior to the announcement. However, we do find substantial change in volume and spread after the announcement. Specifically, spread increases dramatically at day 0 and day 1 (relative to the announcement day), and persistently go back the normal level after that. Significant increases in trading volume begin at the announcement date and go back the normal level after about 10 trading days. This is consistent with the models of Kyle (1985), Easley and O'Hara (1982) and Kim and Verrecchia (1991a, 1991b) in that increased information asymmetry at announcement dates should result in higher trading volumes as well as increased spreads. We speculate that the directors or corporate insiders do have private information, but they are not allowed to trade before the announcement made public. Therefore, right after the announcement, the market makers will increase bid-ask spread because they believe that corporate insiders will make use of their information plus their superior-information processing abilities.

We also postulate a cross sectional model in which spread is a function of normal trading volume, unusual trading volume, and return variability. As predicted by the inventory control

model, we find that spread is negatively correlated to trading volume but positively correlated to return variability. We also find that unusual trading volumes which proxies for asymmetric information are significantly positively related to spread, as predicted by the adverse selection model.

The paper now proceeds as follows. In section II presents the data. Section III discusses the methodologies used in this study. Section IV presents the summary empirical results.

II. Data

Our restatement announcement sample is obtained from GAO Financial Statement Restatement Database released on January 2003 by the United States General Accounting Offices for the period 1997-2002. We include only those companies whose stocks are trading in NYSE and AMEX. Then, we select only companies which have data on book value, SIC code, return, and intraday transaction data available during the period 1997-2002. We obtain book value, SIC code from Compustat tape, stock return from CRSP database, spread from NYSE TAQ. Table 1 presents some statistics on the sample.

We use four measures of spread. Dollar spread is the difference between the ask and bid prices. Proportion dollar spread is the dollar spread divided by the bid-ask mid point. Effective spread is two times the absolute value of the difference between transaction price and bid-ask midpoint. Proportional effective spread is effective spread scaled by transaction price. We use Lee and Ready (1991) methodology using 5-second delay to match quotes and transaction prices. Daily spread is the average of spread for every quote reported during the days.

III. Methodology

A. Univariate test

We examine abnormal volume, abnormal return, and abnormal spread around the restatement announcements and compare with those of the matching firms.

Matching firms

First we find matching firms for the restatement companies based on SIC code, book to market value, and size and then analyze effect of the announcements on trading activity based on the differences between the restatement firms and the matching firms. This procedure allows us to control for confounding market- and industry-wide effects and size and book-to-market factors that might affect return and volume.

We define the universe of possible matching firms as all firms in the intersection of CRSP and Compustat, with financial statement data available as of the most recent month-end at least 30 days before the announcement date. From this, we then select all firms that have the same two-digit SIC code as the restatement company, with size between 70% to 130%. Out of these possible firms, we then select matching firm that has the closest book-to-market ratio. If we are unable to find the match using the above criteria, we relax our size constraint to +/- 80%, and next relax our industry constraint to only a one-digit SIC code match. Finally, we remove the industry constraint completely to locate matches for two remaining variables.

Measuring abnormal return, abnormal volume, abnormal spread

Abnormal return: We define abnormal return as the daily difference in returns between target and its matching firm. Since our matching firm is based on industry, size, book to market, the abnormal return should control for famous effects found in literature (i.e., industry, size and book to market factors).

Abnormal volume: We use the following method to determine abnormal volume. First, define normal trading volume for a restatement company by taking average daily volume over an estimation period, from day –270 to –60 and from day +60 to +270 relative to the announcement. After that, we compute a time series of abnormal volume by taking the daily volume on a given day less normal volume calculated above, and divided by normal volume. This abnormal volume considers firm-specific trading only. It does not take into account of other effect that may affect volume but unrelated to the announcement. Therefore, we repeat the above steps for the matching firms and compare with those restatement firms.

To compute **abnormal spread**, we use the same procedure as in calculating abnormal volume.

B. Cross sectional tests

We use cross sectional regression analysis to further examine the impact of trading activities on spread during both nonevent and event trading. We use dummy variables to test for event-related shifts in the intercept and the slope coefficients on the variables studied. The event window is split into three subperiods: PRE (day –15 through day –2), DURING (day –1 and day 0), and POST (day +1 through day +15). All days are relative to the announcement date (day 0). We use trading volume, excess volume, and return variability to proxy for sources of bid-ask spread documented in literature, i.e., order processing costs (trading volume), adverse selection costs (excess volume) and inventory cost (trading volume and return variability). The model is as follows:

$$SPREAD_{it} = a_0 + a_1 retsq_{it} + a_2 vol_{it} + a_3 xvol_{it} + a_4 PRE + a_5 DURING + a_6 POST$$

$$+ \; a_7 PRE \times vol_{it} + a_8 DURING \times vol_{it} + a_9 POST \times vol_{it}$$

$$+ \; a_{10} PRE \times xvol_{it} + a_{11} DURING \times xvol_{it} + a_{12} POST \times xvol_{it} + \varepsilon_{it}$$

where $retsq_{it}$ is the squared return, vol_{it} is trading volume, and $xvol_{it}$ is excess volume defined as the difference between actual daily trading volume and its average trading volume over time. *PRE, DURING, POST* are dummy variables defined as above.

$PRE \times vol_{it}$, $DURING \times vol_{it}$, $POST \times vol_{it}$ measure impact of trading volume on spread during the event window covering –15 to +15 days.

$PRE \times xvol_{it}$, $DURING \times xvol_{it}$, $POST \times xvol_{it}$: measure impact of excess trading volume during the event window covering –15 to +15 days.

IV. Results

A. Results from univariate tests

Table 2 shows average daily abnormal returns for restatement firms and average daily abnormal volume for restatement and matching firms. Before the announcement date, abnormal return behaves quite steadily, they are small and statistically insignificant . However, on the announcement date, abnormal return dramatically and significant negative AR of –2.38% are produced. The decrease continues in day 1 with –3.08%, and reverse back to the normal level on day 2 before dropping substantially again in day 3 with –1.73%. Clearly, the wealth effect is negative and significant, and for the two and four day windows appear to be around -5.5% and –7% respectively. The results are depicted graphically in Figure 2.

Consider now the results for abnormal volume presented in Table 2 and graphically produced in Figure 1. The impact of restatement on trading activity is also dramatic. There is a sharp and significant increase in abnormal volume of restating firms commencing on the day of the

announcement and persisting for 7 days. No significant change in abnormal volume is observed for matching firms, and the difference between the restating and matching firms are also significant.

Now consider the impact on bid-ask spread. Table 3 shows the abnormal dollar spread for restating firm is insignificant and small before the announcement date, but increases substantially and significantly on day 0 and day 1. It then drops back to the normal level. The abnormal spread for the matched firms remain small and insignificant. The results are the same for all 4 measures of spreads (for space consideration, only dollar spread results are reported). Figure 3 shows the impact on the abnormal dollar spread and Figure 4 illustrates dramatically the effect on abnormal effective spread. These results are consistent with Kim and Verrecchia (1994) in that corporate insiders may have private information before the announcements, but they are prohibited from trading. Therefore, once the announcements have been made public, they are able to process information much faster and better than other investors. Hence, market makers will increase the spread to compensate for this adverse selection costs.

B. Results from the cross sectional tests

Table 4 presents the results from the cross sectional tests. Four alternative measures of spread are used as the dependent variable. White's correction for hetroskasticity are used in the regressions. Here are the salient points. First, spread is negatively and significantly related to trading volume and positively related to return variability. This appears to be consistent with inventory control model. Second, spread is positively related to excess trading volume (proxy for informed trading). This supports the adverse selection model. The results are similar for all four measures of spread.

Dummy variables are used to find out whether there is any changes in the spread in the event period which is not accounted for by normal and excess trading volume or by return variability. Significant coefficients on the dummies would suggest that the bid-ask spread during the event window reflects changes in information asymmetry or inventory costs which are not entirely capture by the explanatory variables. The dummy variables cover the period immediately before, during, and immediately after the event. The PRE dummy covers –15 to –2 days, DURING covers days 0 and 1 and POST covers +2 to +15 days.

Consider now the dummy variables for *vol* and *xvol*.

- $PRE \times vol_{it}$, $DURING \times vol_{it}$, $POST \times vol_{it}$ measure impact of trading volume on spread during the event window which covers days –15 through +15. These dummy variable coefficients are significant for the $POST \times vol_{it}$ measure.
- $PRE \times xvol_{it}$, $DURING \times xvol_{it}$, $POST \times xvol_{it}$: measure impact of excess trading volume during the event window which covers days –15 through +15. The $PRE \times xvol_{it}$ dummy variable is significant. This suggests the relationship between *xvol* and spread declined in the pre-period just before the event.

In the cross sectional model the spread is postulated to be a function of normal trading volume, unusual trading volume, and return variability. As predicted by the inventory control model, we find that spread is negatively correlated to trading volume but positively correlated to return variability. We also find that unusual trading volumes which proxies for asymmetric information are significantly positively related to spread, as predicted by the adverse selection model.

REFERENCES

A.R. Admati and P. Pfleiderer, " A Theory of Intraday Patterns: Volume and Price Variability", Review of Financial Studies (Spring 1988), pp 3-40.

A. Akhibe, R. Kudla, and J. Madura, "Why are some corporate earnings restatements more damaging," Applied Financial Economics, March 2005, v. 15, pp 327-336.

J. Conrad and C. Niden, "Order Flow, Trading costs and Corporate Acquisition Annoucement", Financial Management, Winter 1992, pp 22-31.

T. Copeland, " A model of asset trading under the assumption of sequential information arrival", Journal of Finance, December 1983, pp 1457-1469.

H. Desai, C. Hogan, and M. Wilkins, "The reputational penalty for aggressive accounting: earnings restatements and management turnover," Accounting Review, Jan 2006, v. 81, pp 83-112.

D. Easley and M. O'Hara, "Price, Trade Size, and Information in Securities Market", Journal of Financial Economics, September 1987, pp 69-90.

M. Erickson, M. Hanlon, and E. Maydew, "How much will firms pay for earnings that do not exist? Evidence of taxes paid on allegedly fraudulent earnings," Accounting Review, April 2004, v. 79, pp 387-408.

P.A. Griffin, "A league of their own? Financial analysts responses to restatements and corrective disclosures," Journal of Accounting, Auditing, and Finance, Fall 2003, v. 18, pp 479-518.

P. Hribar and N. Jenkins, "The effect of accounting restatement on earnings revisions and the estimated cost of capital," Review of Accounting Studies, June-Sept. 2004, vol.9, pp 337-356.

C. Lee, B. Mucklow, and M. Ready, “Spread Depths and the Impact of Earnings Information: An Intraday Analysis”, The Review of Financial Studies, 1993, v.6, pp 345-374.

A. Kyle, “Continuous auctions and insider trading”, Econometrica, November 1985, pp 1315-1335.

A. Levitt, “Testimony concerning commission’s auditor independence proposal before the senate subcommittee on securities committee on banking, housing, and urban affairs on September 29, 2000. http://www.sec.gov/news/testimony/ts52000.htm

Z. V. Palmrose, V. Richardson, and S. Scholz, “The determinants of market reactions to restatement announcements,” Journal of Accounting and Economics, Feb 2004, v. 37, pp 59-89.

Z. V. Palmrose, and S. Scholz, “The circumstances and legal consequences of non-GAAP reporting: Evidence from restatements,” Contemporary Accounting Research, Spring 2004, v. 21, pp 139-180.

S. Srinivasan, “Consequences of financial reporting failture for outside directors: Evidence from accounting restatements and audit committee members,” Journal of Accounting Research, May 2005, v.43, pp 291-334.

Table 1: Descriptive Statistics: Restatement and Matching Firms

The table provides descriptive statistics for our sample from 1997-2002. Variables are estimated the end of the most recent month-end at least 30 days before the restatement announcement date. Restatement firms and their matches must have CRSP share price, volume, number of shares outstanding data, positive common equity and SIC code provided by Compustat. Restatement and matching firms must trade on NYSE or AMEX. Number of shares outstanding is in million shares, market capitalization is in million dollars. Betas are estimated using the past 2 year window.

Our methodology to find the matching firms is described in detail in Section III. Briefly, we select all firms that have the same two-digit SIC code as the restatement company, with size between 70% to 130%. Out of these possible firms, we then select matching firm that has the closest book-to-market ratio. If we are unable to find the match using the above criteria, we relax our size constraint to +/- 80%, and next relax our industry constraint to only a one-digit SIC code match. Finally, we remove the industry constraint completely to locate matches for two remaining variables

Panel A provides descriptive statistics of restatement and matching firms in terms of share prices, number of shares outstanding,, market capitalization, book-to-market, and beta. Panel B gives a breakdown of the sample into reasons of restatement announcements. There are 9 reasons: (1) acquisitions and mergers, (2) cost or expenses, (3) in-process research and development, (4) reclassification, (5) related-party transactions, (6) restructuring, assets or inventory, (7) revenue recognition, (8) security related, and (9) other reasons (see GAO database for more detail). Panel C divide the sample according to the prompter of the restatement announcements: (1) SEC, (2) auditors, (3) company, and (4) other entities.

Panel A: Sample descriptive statistics of restatement and matching firms

	Number of Restatements	Median Restatement	Median Match	Mean Restatement	Mean Match
Share Prices ($)	182	21.97	25.34	27.14	30.53
Shares Outstanding (millions)	182	52.66	52.20	193.56	225.70
Market Capitalization ($millions)	182	1095.29	1408.59	6413.90	9454.09
Book-to-market	182	0.52	0.48	0.76	0.60
Beta	182	0.62	0.61	0.75	0.74

Panel B: Restatements by Reasons

Year	Total	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1997	9	1	3	0	1	0	1	1	1	1
1998	9	1	3	0	0	0	0	1	0	4
1999	31	4	1	4	0	0	12	7	0	3
2000	36	2	4	0	2	1	7	14	1	5
2001	55	0	4	0	1	4	6	31	2	7
2002	42	2	3	0	1	7	8	8	8	5
Total	182	10	18	4	5	12	34	62	12	25

Panel C: Restatements by Prompters

Year	Total	SEC	Auditor	Company	Other
1997	9	1	0	4	4
1998	9	2	0	6	1
1999	31	15	2	6	8
2000	36	4	3	14	15
2001	55	4	3	15	33
2002	42	6	5	18	13
Total	182	32	13	63	74

Table 2: Daily Return and Volume

The table shows average daily abnormal returns for restatement firms and average daily abnormal volume for restatement and matching firms. Abnormal returns are calculated by subtracting raw matching firm returns from raw restatement firm return. Abnormal volume is measured as daily volume minus normal volume scaled by normal volume. Normal volume is estimated from two periods (-270 to –60) and (30 to 270).

Days	Abnormal Return	Abnormal Return	Abnormal Volume	restatement	Abnormal Volume	match	Less Match	restatement less match
-15	1.06%	2.20	1.25%	0.09	15.68%	1.24	-14.43%	-0.78
-14	0.07%	0.19	-12.74%	-1.45	9.09%	1.06	-21.83%	-1.82
-13	-0.61%	-1.51	-4.59%	-0.63	1.36%	0.14	-5.95%	-0.49
-12	0.31%	0.68	-13.88%	-2.21	-11.83%	-1.17	-2.05%	-0.18
-11	0.08%	0.15	-12.59%	-2.09	-1.71%	-0.21	-10.88%	-1.09
-10	-0.61%	-0.94	-22.81%	-3.50	-5.30%	-0.38	-17.51%	-1.15
-9	-0.37%	-1.03	-4.87%	-0.51	-0.49%	-0.04	-4.38%	-0.31
-8	0.99%	2.36	-9.98%	-0.89	-13.29%	-1.69	3.31%	0.25
-7	0.17%	0.40	-14.37%	-2.31	-2.21%	-0.23	-12.16%	-1.11
-6	0.13%	0.38	-10.96%	-1.71	9.55%	0.59	-20.51%	-1.22
-5	-0.21%	-0.53	-16.12%	-3.04	7.83%	0.57	-23.95%	-1.67
-4	0.00%	0.00	13.29%	0.97	-4.77%	-0.63	18.06%	1.19
-3	0.23%	0.36	3.90%	0.28	8.36%	0.60	-4.46%	-0.22
-2	-0.47%	-1.08	4.05%	0.39	-0.35%	-0.03	4.40%	0.30
-1	0.42%	1.32	2.80%	0.29	-5.01%	-0.62	7.81%	0.69
0	-2.38%	**-3.32**	145.65%	**3.98**	17.69%	1.57	127.96%	**3.47**
1	-3.08%	**-3.29**	272.38%	**4.66**	0.06%	0.01	272.32%	**4.64**
2	0.23%	0.46	142.58%	**3.04**	-10.93%	-1.13	153.51%	**3.19**
3	-1.73%	**-3.85**	74.54%	**2.83**	9.23%	0.43	65.30%	**2.01**
4	-0.53%	-0.82	48.21%	**2.53**	-9.22%	-1.11	57.42%	**2.72**
5	-0.63%	-1.12	48.16%	**2.80**	-7.12%	-1.14	55.28%	**3.00**
6	0.29%	0.83	24.30%	**2.14**	-6.41%	-0.83	30.71%	**2.27**
7	0.04%	0.09	18.82%	**2.25**	-6.45%	-0.92	25.27%	**2.23**
8	0.36%	0.54	11.13%	1.24	-13.48%	-2.16	24.60%	**2.28**
9	0.11%	0.26	14.83%	1.43	-4.98%	-0.57	19.81%	1.56
10	**-0.22%**	**-0.45**	12.01%	1.08	1.28%	0.10	10.72%	0.63

Table 3: Daily Average Abnormal Spread

The table shows average abnormal dollar spread for restatement and matching firms. Dollar spread is the difference between ask and bid price. Normal dollar spreads are estimated from days –270 through –60 and from days +30 through +270. Abnormal spread is calculated by subtracting normal spread from daily spread, and dividing the standard deviation of spread over the estimation period.

Day	Restatement Abnormal Dollar Spread	t-scores restatement	Match Abnormal Dollar Spread	t-scores match	Restatement Less Match	t-scores restatement less match
-15	-0.03	-0.35	-0.10	-1.14	0.07	0.62
-14	-0.04	-0.63	-0.13	-1.72	0.09	0.86
-13	0.10	1.08	0.20	0.80	-0.10	-0.39
-12	-0.01	-0.09	-0.02	-0.18	0.01	0.09
-11	-0.14	-1.66	-0.02	-0.22	-0.12	-0.92
-10	-0.19	-2.07	-0.18	-1.69	-0.01	-0.07
-9	-0.04	-0.49	-0.11	-1.07	0.07	0.49
-8	0.00	-0.03	-0.07	-0.82	0.07	0.56
-7	-0.07	-0.92	-0.03	-0.42	-0.04	-0.40
-6	0.07	0.68	-0.09	-1.10	0.16	1.23
-5	-0.05	-0.68	0.11	1.16	-0.16	-1.33
-4	0.01	0.11	-0.11	-1.29	0.12	1.00
-3	-0.17	-1.94	-0.17	-1.62	0.00	0.02
-2	0.08	0.73	-0.12	-1.28	0.21	1.39
-1	-0.02	-0.34	-0.16	-1.84	0.14	1.22
0	0.28	**2.90**	-0.04	-0.48	0.32	**2.54**
1	0.40	1.63	-0.11	-1.32	0.51	**1.97**
2	-0.06	-0.63	0.02	0.21	-0.08	-0.61
3	-0.06	-0.56	-0.02	-0.17	-0.04	-0.26
4	-0.12	-1.27	-0.15	-1.77	0.03	0.26
5	-0.05	-0.44	-0.01	-0.08	-0.03	-0.17
6	-0.15	-2.09	-0.28	-3.03	0.13	1.09
7	-0.18	-2.58	-0.02	-0.19	-0.16	-1.50
8	-0.16	-2.32	0.13	1.06	-0.29	-2.06
9	-0.10	-1.24	-0.04	-0.38	-0.06	-0.49
10	-0.20	-2.69	-0.17	-1.84	-0.02	-0.18
11	-0.10	-0.98	-0.21	-1.89	0.11	0.73
12	-0.22	-2.06	-0.26	-2.87	0.04	0.30
13	-0.11	-1.57	-0.12	-1.17	0.01	0.06
14	-0.21	-3.24	0.00	-0.06	-0.21	-2.01
15	-0.25	-3.55	-0.07	-0.98	-0.18	-1.74

Table 4: OLS Estimation of the Cross-Sectional Determinants of Restatement Firm Spread during Nonevent Trading and around the restatement announcements

$$SPREAD_{it} = a_0 + a_1 retsq_{it} + a_2 vol_{it} + a_3 xvol_{it} + a_4 PRE + a_5 DURING + a_6 POST + a_7 PRE \times vol_{it} + a_8 DURING \times vol_{it} + a_9 POST \times vol_{it} + a_{10} PRE \times xvol_{it} + a_{11} DURING \times xvol_{it} + a_{12} POST \times xvol_{it} + \varepsilon_{it}$$

The table presents the regression results of spread on other variables as in the above model. Four measures of spread are used. They are dollar spread, proportional spread (dollar spread divided by the bid-ask midpoint), effective spread (two times the absolute value of the difference between the bid-ask midpoint and the transaction price), and proportional effective spread (effective spread divided by the transaction price).

Definition of variables:

retsq is return squared; *vol* is volume; *xvol* is excess trading volume (defined as the difference between actual daily trading volume and its average trading volume over time; *PRE* is a dummy variable (= 1 for days –15 through –2 relative to the announcement date, *PRE* = 0 all other days); *DURING* is a dummy variable (= 1 for days –1 through 0 relative to the announcement date, *DURING* = 0 all other days); *POST* is a dummy variable (=1 for days +1 through +15 relative to the announcement date, *POST* = 0 all other days).

The regression coefficients and their p-values (adjusted for heteroskedasticity) are reported

	Panel A: Dollar Spread		**Panel B: Effective Spread**	
Variable	Coefficient	p-value	Coefficient	p-value
Constant	0.1315	0.000	0.0972	0.000
retsq	0.3955	0.001	0.4087	0.001
vol	-0.0054	0.000	-0.0010	0.0003
xvol	0.0056	0.000	0.0020	0.000
PRE	-0.0083	0.153	-0.0064	0.274
DURING	0.0015	0.913	0.0089	0.516
POST	-0.0192	0.000	-0.0137	0.0005
$PRE \times vol$	0.0006	0.483	0.0018	0.1905
$DURING \times vol$	0.0001	0.937	-0.0008	0.6602
$POST \times vol$	0.0016	0.001	0.0017	0.0902
$PRE \times xvol$	-0.0025	0.000	-0.0023	0.0446
$DURING \times xvol$	-0.0008	0.606	-0.0014	0.5657
$POST \times xvol$	-0.0006	0.505	0.0025	0.1451

	Panel C: Proportional Dollar Spread		**Panel B: Proportional Effective Spread**	
Variable	Coefficient	p-value	Coefficient	p-value
Constant	0.0102	0.000	0.0072	0.000
retsq	0.3198	0.000	0.2605	0.000
vol	-0.0007	0.000	-0.00006	0.0502
xvol	0.0006	0.000	0.00012	0.0064
PRE	-0.0010	0.0274	-0.00073	0.0786
DURING	-0.0017	0.0753	-0.00092	0.2354
POST	0.0010	0.1641	0.00112	0.0617
$PRE \times vol$	-0.00004	0.6649	0.00008	0.6914
$DURING \times vol$	0.0002	0.3714	-0.00018	0.2002
$POST \times vol$	-0.0001	0.1356	-0.00021	0.1436
$PRE \times xvol$	-0.0005	0.000	-0.00039	0.0279
$DURING \times xvol$	-0.0007	0.0289	-0.00042	0.1192
$POST \times xvol$	-0.0004	0.0034	-0.00012	0.4858

Figure 1: Abnormal Volume around Restatement Announcements

This figure presents the abnormal trading volume around the restatement announcements for restatement firms and matching firms from day -60 to day 30. Abnormal volume is measured as daily volume minus normal volume scaled by normal volume. Normal volume is estimated from two periods (-270 to –60) and (30 to 270).

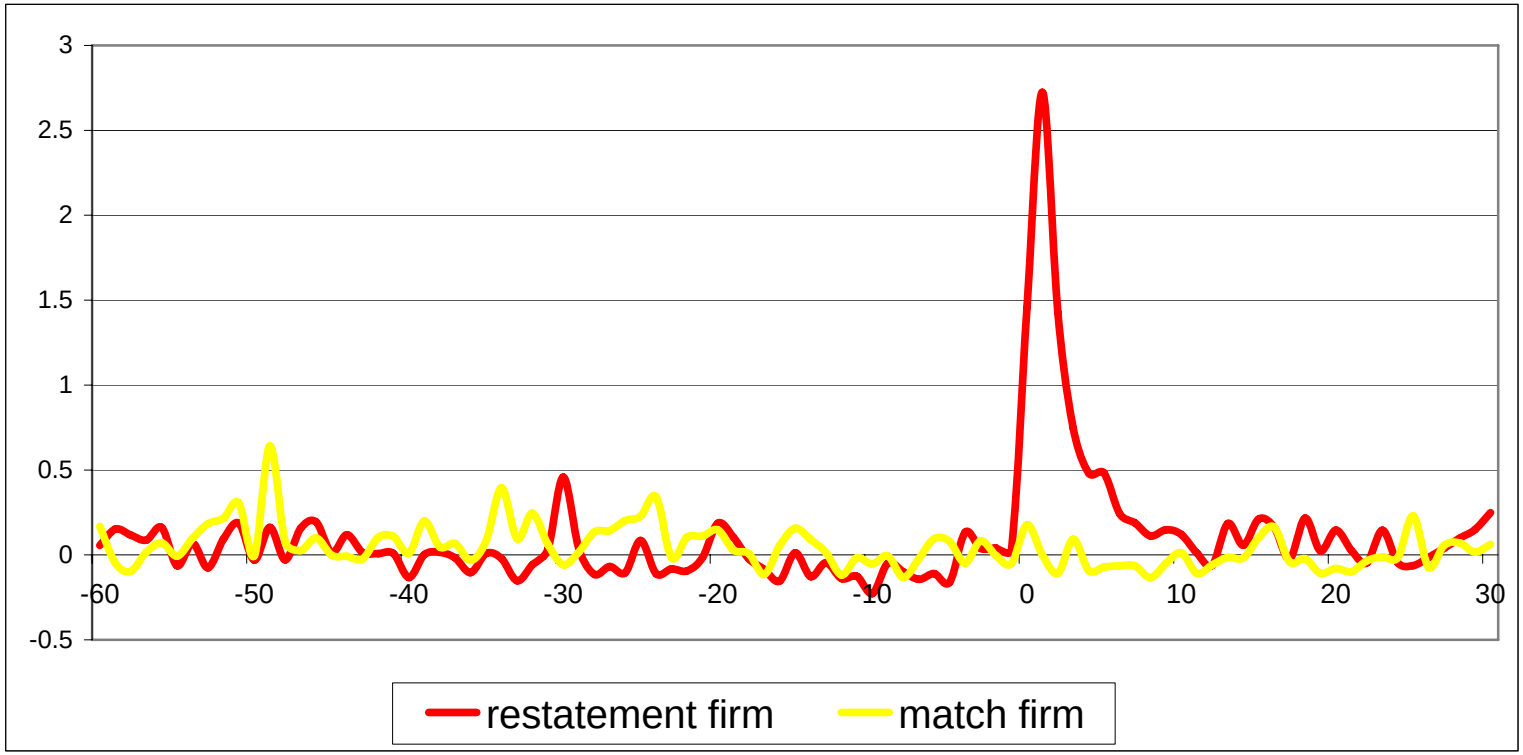

Figure 2: Abnormal Return around Restatement Announcements

This figure presents the abnormal return around the restatement announcements from day -60 to day 30. Abnormal returns are calculated by subtracting raw matching firm returns from raw restatement firm return.

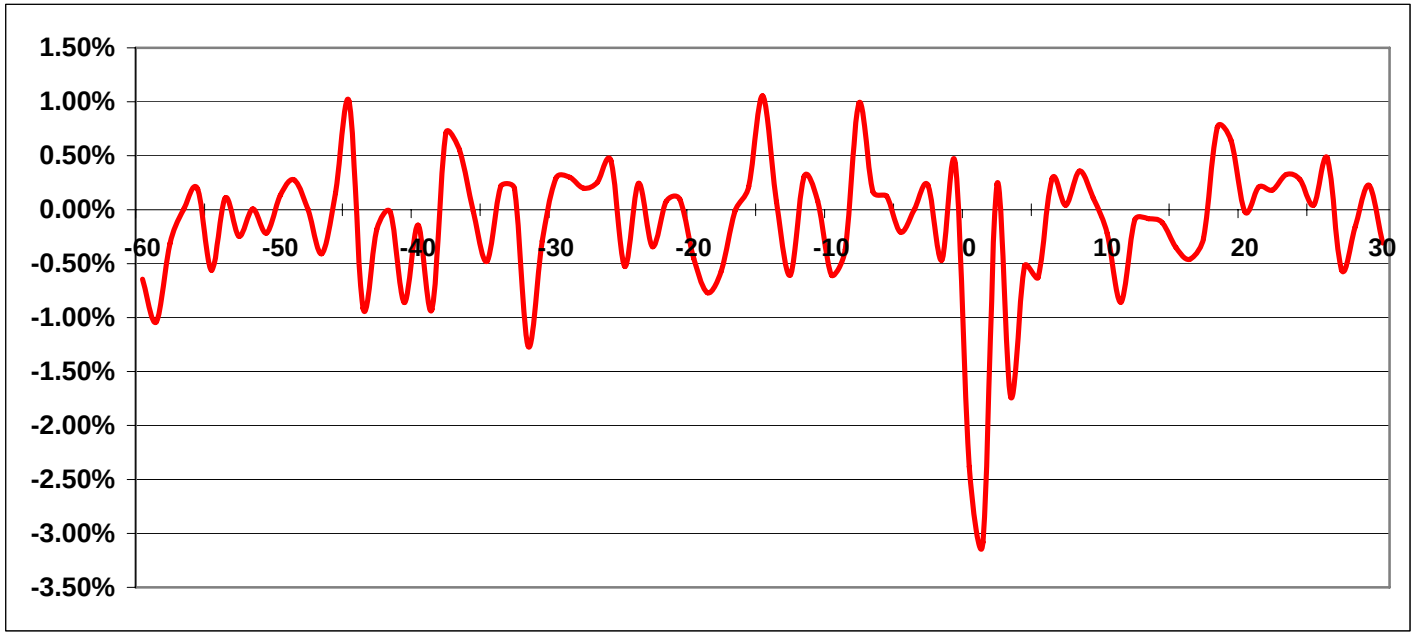

Figure 3: Abnormal Dollar Spread around Restatement Announcements.

This figure presents the mean abnormal dollar spread for the restatement and matching firms before and after the restatement announcements, from day –60 to day +30, where the announcement occurs on day 0. Dollar spread is the average difference between the ask and bid price for all transactions for a given firm on that day. Normal spread is estimated for each firm using average daily spread from day –270 to –60 and from +30 to +270. Abnormal spread is calculated as dollar spread less normal spread divided by the standard deviation of normal spread.

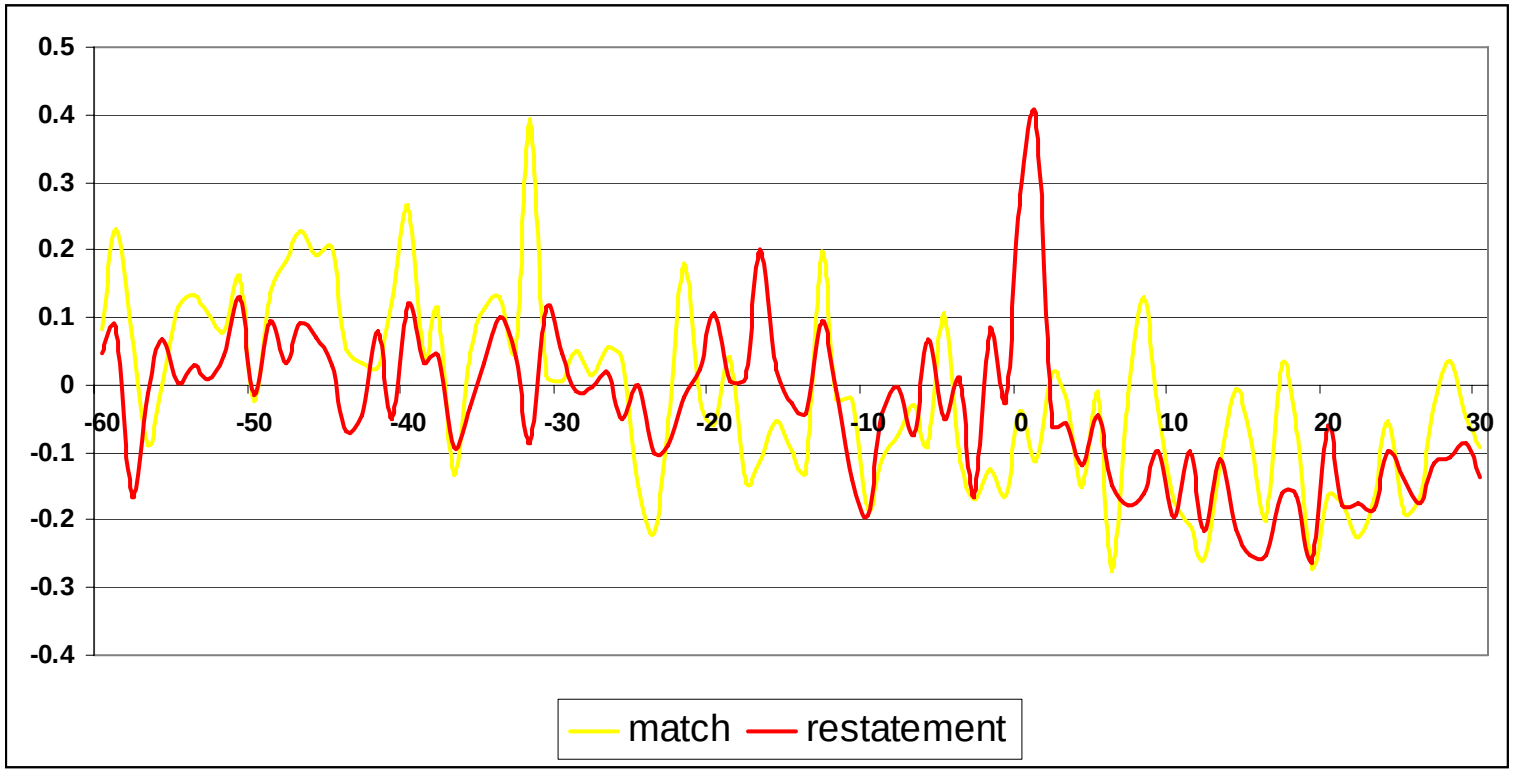

Figure 4: Abnormal Effective Spread around Restatement Announcements.

This figure presents the mean abnormal effective spread for the restatement and matching firms before and after the restatement announcements, from day –60 to day +30, where the announcement occurs on day 0. Effective spread is the average of two times the absolute difference between the midpoint and the transaction price for all transactions for a given firm on that day. Normal effective spread is estimated for each firm using average daily spread from day –270 to –60 and from +30 to +270. Abnormal effective spread is calculated as effective spread less normal effective spread divided by the standard deviation of normal effective spread.