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Quality of financial information and liquidity

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Abstract

This paper examines the relationship between liquidity and quality of financial information by analyzing long-term trends in Amihud's (2002) illiquidity measure for firms that restate financial statements. I find that for most income decreasing restatements illiquidity increases several months before restatement announcement and remains at elevated levels one year after restatement. The result is most pronounced for firms listed on NASDAQ. Increase in illiquidity is greater upon restatements due to revenue recognition, those prompted by party other than auditor, those made by larger firms with high volatility of returns and low price levels. Income increasing restatements do not affect information asymmetry of the firm. Overall, my results indicate a positive relationship between quality of financial information and liquidity.

Keywords: liquidity, financial statement restatements, misreporting, earnings management, information asymmetry, quality of financial information, disclosure

JEL Classification: G14, G12, M41

1. Introduction

In the aftermath of the corporate scandals of the Enron era and the recent financial crisis, policy makers and regulators have called for improved quality of financial reporting and greater transparency. However, the evidence regarding the costs and benefits of financial reporting and disclosure remains limited (Leuz and Wysocki (2008)).[1] The benefit of disclosure best supported by theory is the increase in liquidity of a firm's shares (Verrecchia (2001)). Liquidity is negatively related to the level of adverse selection in the market, which results from some traders having informational advantage over other traders (Glosten and Milgrom (1985), Kyle (1985)). If better quality financial information reduces the level of adverse selection in the market, then liquidity will increase.

Empirical literature on the relation between the quality of financial information and liquidity is limited (Leuz and Verrecchia (2000)). Several papers examine the association between liquidity and analyst evaluations of disclosure quality (Welker (1995), Healy, et al. (1999) and Heflin, et al. (2002)).[2] They find that better disclosure increases liquidity. For example, Welker (1995) documents that firms in the lowest third of the disclosure rankings have a 50% higher bid-ask spread. Leuz and Verrecchia (2000) use an event study framework and show that German firms that commit to higher levels of disclosure by switching to International Accounting Standards (IAS) or U.S. GAAP experience a 35% decrease in bid-ask spread and a 50% increase in share turnover.

[1] The terms "disclosure", "transparency" and "quality of information" are used interchangeably.

[2] These papers use CFA Institute (formerly Association for Investment and Management Research (AIMR)) score to measure quality of firm's disclosure. The score is composed by financial analysts and evaluates firm disclosure based on annual published information, quarterly and other published information, and communications with analysts.

Ng (2008) examines other measures of information quality and finds that management forecast frequency is negatively associated with a firm's liquidity, while relevance of earnings and accrual quality are not significantly associated with a firm's liquidity. Jayaraman (2008) finds that the bid-ask spreads and the probability of informed trading are higher when public information is less informative, e.g. when the difference between the volatility of earnings and the volatility of cash flows is high. This relation holds both when earnings are smoother than cash flows and when earnings are more volatile than cash flows. Bhattacharya, Desai and Venkataraman (2010) find that accrual quality is positively associated with high frequency measure of the adverse selection component of the bid-ask spread, and that firms with poor earnings quality experience a greater increase in information asymmetry around earnings announcements. Ascioglu, Hegde and McDermott (2005) find that auditor compensation, which has been found to be associated with disclosure quality, decreases liquidity for firms with weak corporate governance.

This paper extends the literature on the relation between liquidity and quality of financial information by examining long-term trends in liquidity for firms that make material mistakes in financial statements requiring a restatement. My research design has several advantages. As pointed out by Leuz and Wysocki (2008) "the existing literature shows that measuring firms' financial reporting and disclosure activities is difficult and that commonly used proxies exhibit many problems." Instead of using a proxy for the quality of financial information, for restating firms one observes the period during which financial statements of a firm were of poor quality and knows the date when the market learns for the first time of the reporting issues. Second, a restating firm can be used as its

own control, therefore eliminating the need to account for potential endogeneity of the firm's quality of financial information and liquidity.

I estimate Amihud's (2002) measure of illiquidity for restating firms over three periods: 1) a one-year period prior to the 1st restated report (pre-error period); 2) the error period, which extends from the first misstated period to the date of restatement announcement; and 3) a three-year period after the restatement announcement (post-restatement period). To the best of my knowledge, this paper is the first to study changes in liquidity around restatement during these periods.

There are several reasons why examination of long-term liquidity around restatement announcement is important. First, studies of short-term changes in information asymmetry provide mixed results. Anderson and Yohn (2002) find that bid-ask spread increases surrounding restatements of revenue accounts. However, Palmrose, Richardson and Scholz (2004) do not confirm this result. Second, in its report to the Securities and Exchange Commission (SEC), the Advisory Committee on Improvements to Financial Reporting (CIFR) expressed concern regarding the time it takes for restating firms to disclose full impact of a restatement.[3] For many firms the time between restatement announcement and the filing of restated financial statements can take as long as one year. According to CIFR, during this period the firms report little financial information. CIFR claims that "[l]imited information seriously undermines the quality of investor analysis" (CIFR 2008, 79). Examination of long-term changes in liquidity after restatement announcement will provide evidence regarding CIFR's concern. It will also provide empirical analysis of the belief of analysts and regulators that restatements cause long-term damage to credibility of firm's financial information (Wilson (2008)). Third,

[3] See Badertscher and Burks (2010) for detailed discussion of this issue.

restatements received considerable attention from law makers and affected such influential regulations as Sarbanes Oxley Act of 2002 (Palmrose, Richardson and Scholz (2004)), making it important to know the full impact of a restatement, which is unlikely to be limited to the short-term window around its announcement.

Using Fama McBeth (1973) type regression that corrects for cross-sectional correlation of residuals, I find that firms restating net income downward (income decreasing restatements) that are listed on NASDAQ experience an increase in illiquidity four months before restatement announcement that continues one year after restatement. For income decreasing restating firms listed on NYSE or AMEX illiquidity increases one month after restatement and remains at elevated levels 12 months after restatement. An increase in illiquidity around restatement announcement for income decreasing restatements is economically important. For NASDAQ (NYSE/AMEX) firms, illiquidity three months before restatement increases 39% (55%), at restatement announcement – 43% (42%) and one year after restatement – 129% (80%) relative to pre-restatement level. I find no changes in illiquidity for firms that restate net income upward (income increasing restatements).

To summarize, this paper finds a substantial increase in information asymmetry in anticipation of income decreasing restatement announcement for firms listed on NASDAQ. For income decreasing restating firms listed on all exchanges information asymmetry increases after restatement and remains at elevated levels for at least one year. Income increasing restatements do not affect information asymmetry of the firm. Overall, my results indicate a positive relation between quality of financial information and liquidity, supporting regulations that aim at improving the quality of financial

information. This analysis is particularly timely given the focus of regulators on restatements and their concern that a firm's information environment is adversely affected by a restatement (Advisory Committee on Improvements to Financial Reporting, 2008).

Cross-sectional analysis of the changes in illiquidity for income decreasing NASDAQ restatements reveals that restatements originated by an auditor result in lower changes in illiquidity both before and after a restatement.[4] Income decreasing NASDAQ restatements experience greater increase in illiquidity prior to restatement. Restatements that affect revenue recognition increase illiquidity more following restatement announcement for firms listed on all exchanges. Larger firms with higher volatility of returns have greater increase in illiquidity, while stocks with higher price experience smaller increase in illiquidity.

The paper contributes to several streams of literature. First, it extends prior research on the implications of the quality of financial information on liquidity. However, I use an event study framework to establish poor quality of financial information as opposed to an imperfect proxy for information quality. Second, the paper contributes to the literature on restatements. Restatements have increased in the past decade, motivating the Sarbanes-Oxley Act of 2002 and several SEC initiatives, which in turn lowered the threshold for errors that required restatements. The full impact of a restatement can be better understood by considering its liquidity effect. This paper is the first to document that income decreasing restatements increase information asymmetry several months before and one year after restatement announcement; and that income increasing restatements do not affect information asymmetry. This paper is also the first

[4] I use GAO (2002) for identification of the prompter of the restatement.

to document cross-sectional differences in the changes of liquidity around restatement announcement. My analysis complements that of Palmrose, Richardson and Sholz (2004), Anderson and Yohn (2002) and Badertscher and Burks (2010) by focusing on much longer windows both before and after restatement, documenting trends in liquidity for different types of restatements and performing cross-sectional analysis of changes in liquidity.[5]

The paper is organized as follows. The next section outlines hypotheses and reviews related literature. My measure of liquidity is discussed in Section 3. Section 4 describes the data and sample selection. Results are presented in Section 5. Section 6 concludes the paper.

2. Hypotheses and literature review

Firms that restate financial statements experience large shareholder losses at restatement announcement (Palmrose, Richardson and Scholz (2004), Akhigbe, Kudla, and Madura (2005)). Large negative reaction to restatements is caused by the revelation that financial information of restating firms is worse than previously believed by the market. Poor quality of financial information can create information asymmetry between buyers and sellers of firm shares, which would result in reduced levels of liquidity of firm shares. This happens because market makers widen the bid-ask spread in order to protect themselves from better informed traders and to be compensated for bearing greater risk (Diamond and Verrecchia (1991), Amihud and Mendelson (1988), Leuz and Verrecchia (2000), Kyle (1985), and Glosten and Milgrom (1985)).

[5] Please see the next section for detailed literature review.

Several papers have examined changes in liquidity around restatement announcements. Anderson and Yohn (2002) study the change in bid-ask spreads during three days before announcement of the problem through three days after restatement filing and find that spreads increase for revenue recognition restatements. Controlling for other factors, they find that information asymmetry decreases upon restatement of restructuring items and increases upon revenue recognition restatements. However, Palmrose, Richardson and Sholz (2004) are unable to replicate these results, finding no changes in bid-ask spreads around restatement announcement. They do find that dispersion of analyst expectations increases substantially at restatement announcement, suggesting increased uncertainty. Using a sample of Canadian restatements, Kryzanowski and Zhang (2010) find that relative quoted and effective spreads increase at restatement announcement and remain higher 46 trading days after restatement. They also find that relative (not absolute) spreads and Amihud's (2002) illiquidity estimates increase for revenue recognition restatements.

Badertscher and Burks (2010) analyze changes in liquidity 90 days prior to restatement, the period between restatement announcement and disclosure of the full impact of restatement (the disclosure period), and 90 days after disclosure. They find no difference in liquidity in these three periods for the full sample and find that fraudulent restatements result in lower liquidity during the disclosure period. In their sample, the disclosure period has a median of zero days for the full sample and 20 days for fraudulent restatements, which is a much shorter window than the one analyzed in this study. The focus of this paper is to analyze long-term changes in liquidity for all restatements.

Prior literature finds that some traders, such as short-sellers, large and institutional investors and insiders, are better informed about the quality of financial reports during the error period and are better able to detect poor earnings quality. For example, Desai, Krishnamurthy and Venkataraman (2006) show that short seller interest in the restatement firms increases steadily prior to restatement announcement starting as early as 24 months before restatement. They also show that short-sellers close their positions after restatement announcement as the stock price declines.[6] Frieder and Shanthikumar (2007) show that large traders sell and small traders buy restating firms one month prior to restatement announcement. Hribar, Jenkings and Wang (2005) find that institutional investors with shorter investment horizons and higher portfolio turnover significantly reduce their holdings in a restating firm at least one quarter prior to the quarter of the restatement.[7] Top management sells substantially more stock during the error period of restating firms that revise earnings downward, correct more than four quarters, experience larger negative reaction at restatement announcement and result in greater dollar losses to insiders upon the announcement.

These studies' results are consistent with the notion that sophisticated investors are better able to see through financial statement errors and that their ability to detect poor earnings quality becomes greater as restatement date approaches. This may lead to a decrease in liquidity in the error period, which is defined as the period during which reported earnings and other financial information contains material errors (see Figure 1). This leads to the first hypothesis tested in this paper.

[6] Efendi, Kinney and Swanson (2004) find similar evidence regarding short-sellers.
[7] See also Burns, Kedia, and Lipson (2006).

Hypothesis 1: *Liquidity of restating firms decreases in the error period. The decrease intensifies as the restatement date approaches.*

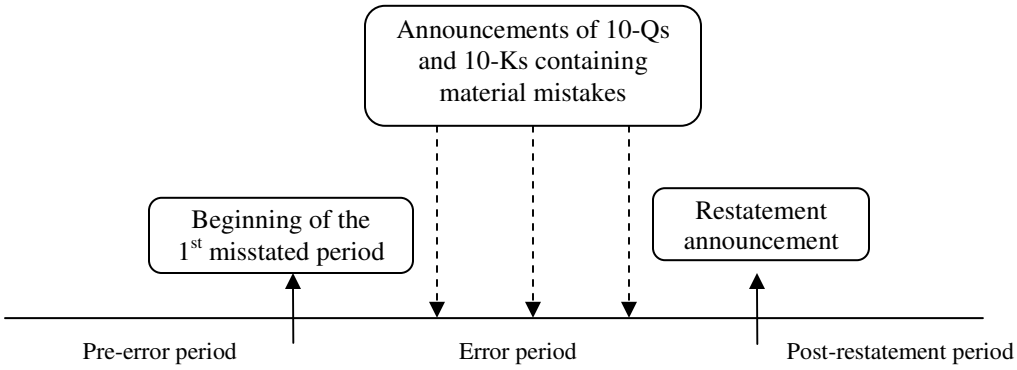

Figure 1: Restatement Timeline

If as a result of sophisticated investors detecting poor earnings quality of restating firms information asymmetry of restating firms increases prior to restatement announcement, the announcement of a restatement can reduce information asymmetry and equalize information sets of different types of investors. At the same time, the restatement announcement provides incentives for investors to obtain private information regarding consequences of a restatement. Moreover, a disclosure of material errors in financial statements can create uncertainty about the quality of future financial information released by the firm. Indeed, Wilson (2008) analyzes earnings response coefficients for earnings announcements surrounding restatements and finds that the information content of earnings declines following a restatement.

Palmrose, Richardson and Scholz (2004) find that many restating firms delist following a restatement. Bardos, Golec and Harding (2010a) show that surviving firms experience negative abnormal returns following a restatement. This suggests that analyst

following and institutional ownership will decline after restatement, which will increase the risk of a market maker facing order imbalance during liquidity shocks for stocks with low investor interest. As a result, a market maker will widen spreads and liquidity will decrease.

Furthermore, restatements can cast doubt on the competency of management and firms' future performance. Consistent with this contention, many restating firms experience turnover of top level management (Desai et al. (2006), Srinivasan (2005), Hennes, Miller, and Leone (2007)). Restatement also increases the likelihood of litigation (Bardos, Golec and Harding (2010b)) and adversely affects the cost of equity and loan contracting (Graham, Li, and Qiu (2008), Bardos and Mishra (2010)). The adverse consequences of restatements can worsen information asymmetry between informed and uninformed investors. Whether or not the decrease in liquidity after restatement is temporary is an empirical question. If investors regain confidence in restating firms with time, the decrease in liquidity will be temporary, which would be consistent with Wilson's (2008) finding that the decline in information content of earnings response coefficient is temporary. I expect that liquidity decreases in post-restatement period; this leads to my second hypothesis:

Hypothesis 2: *Liquidity of restating firms decreases in post-restatement period.*

3. Measure of illiquidity

To test the hypotheses, I analyze the liquidity of restating firms in pre-error, error and post-restatement periods. The level of liquidity in the pre-error period, during which financial statements did not contain material errors, serves as a baseline. Market

microstructure literature offers several definitions of liquidity. Most prominent is Kyle's (1985) lambda, measuring the impact of order flow on price. Other measures include quoted bid-ask spread of stock returns (Amihud and Mendelson (1986)) and price response to signed order flow with the fixed cost of trading based on continuous data on transaction and quotes (Brennan and Subrahmanyam (1996)). The most frequently used empirical liquidity measures require intraday data from the NYSE Trade and Quote (TAQ) database. Because my focus is on the long-run changes in information asymmetry, which requires analysis of the trends in liquidity over several years, I use Amihud's (2002) illiquidity measure (*ILLIQ*) that is calculated using daily CRSP data. *ILLIQ* proxies Kyle's lambda, which measures the price impact of trading volume using high frequency data. High adverse selection would result in greater price impact. The disadvantage of using *ILLIQ* is that it is less precise than microstructure measures. However, Hasbrouck (2010) finds that Amihud's measure has high correlation with measures of liquidity calculated from high frequency data. For example, the correlation of *ILLIQ* with effective spread is 93.7%. Moreover, he finds that *ILLIQ* has the highest correlation with high frequency measures among all low frequency measures of liquidity. Another advantage of using a measure calculated from daily data is that TAQ data is not available for many small firms, which constitute a significant portion of the restatement sample (Badertscher and Burks (2010)).

The Amihud (2002) price impact measure, *ILLIQ,* is defined as the absolute value of daily stock return, *R*, divided by the daily dollar trading volume, *VOLD*. It measures the trading volume needed to move the stock price.

I calculate daily *ILLIQ* for restating firm *i* for each day *d* as follows:

$$ILLIQ_{id} = \frac{|R_{id}|}{VOLD_{id}} * 10^6 \qquad (1)$$

To minimize the influence of outliers on my results, I winsorize *ILLIQ* at 1% and 99% levels. I consider NASDAQ and NYSE/AMEX stocks separately because trading costs of NASDAQ-listed stocks are higher than NYSE/AMEX-listed stocks and because volume has different meaning for NASDAQ stocks (Bessembinder and Kaufman (1997), Bessembinder (1999) and (2003) and Reinganum(1990)).

4. Data

The restatement sample for the period January 1, 1997 through June 30, 2002 was initially obtained from GAO (2002). I restrict my sample to 1997-2002 period for several reasons. First, I analyze liquidity one year after a restatement and do not want post-restatement period to coincide with financial crisis. The financial crisis of 2008 has been associated with large decreases in liquidity, especially around the collapse of Lehman. Therefore, I constrain my sample so that I do not incorrectly attribute decrease in liquidity to restatements that may actually be related to the financial crisis. Second, my sample ends before the passages of SOX and therefore all restatements in my sample were made in the same regulatory environment. The number of restatements increased substantially after the passage of SOX, largely because of the increase in the number of less egregious restatements. Therefore, by limiting the sample to the pre-SOX period, I focus on "a time when restatements were less frequent and firms faced less pressure to restate for errors of questionable materiality" (Burks (2009)).

I collect additional information regarding each restatement from the Lexis-Nexis and Factiva databases. I exclude restatements that are caused by an adoption of new

accounting rules or by a change in method of accounting, and retain only restatements due to an error or improper interpretations of GAAP. I also delete restatements that affect only the timing of item recognition and had no impact on annual net income or when I could not determine the impact on the net income. I require that a restating firm has the necessary CRSP and Compustat data. My final dataset consists of 468 restatements made by 442 firms. Most firms (95%) restate financial statements only once during my sample period.[8]

Table 1, Panel A shows the distribution of restatements by year and exchange. There has been an increase in the number of restatements between 1997 and 2000, with a decrease in 2001. Note that for 2002, I include restatements only through June 30, 2002 so that they precede SOX enactment. On average, 63% of restatements are made by firms listed on NASDAQ and this average is fairly consistent for all years except 1999 and 2002.

Restatements that amend at least one 10-K (*Annual*) constitute the majority of my sample (see Table 1, Panel B). The vast majority of restating firms (83%) revise net income downward. I call such restatements *income decreasing restatements*. Restatements that revise net income upward are called *income increasing restatements*. I analyze income decreasing and income increasing restatements separately. While any restatement indicates poor quality of previously reported financial statements, an income decreasing restatement may have different implications for information asymmetry than an income increasing restatement. Badertscher, Phillips, Pincus and Rego (2009) find that relative to income decreasing restatements (upward earnings management misstatement

[8] My results are robust to limiting the sample to firms that made only one restatement during my sample period and to just analyzing the first restatement of all firms.

firms), income increasing restatements (downward earnings management misstatement firms) exhibit *lower* accruals, book-tax differences, interest coverage, external financing, changes in accounts receivable and inventory; *higher* level and change in cash flows from operations and higher size; and lower mean but higher median profitability.[9] They conclude that "misstatement firms that manage earnings downward appear to differ in fundamental ways from misstatement firms that manage earnings upward, which suggests that researchers should distinguish between upward and downward earnings management," (page 6).

About thirty two percent of restatements are correcting revenue accounts, with NASDAQ firms correcting revenue accounts more often than NYSE/AMEX firms. Income increasing restatements correct revenue much less frequently (11.86% compared with 35.13%). Auditors originated 8.97% of income decreasing restatements and only 3.39% of income increasing restatements. On the contrary, the SEC originates more income increasing than income decreasing restatements in percentage terms: 52.54% of income increasing and 14.10% of income decreasing restatements.

Consistent with prior studies, I find negative abnormal return, *CAR01*, of -8.97% at restatement announcement. *CAR01* is calculated as a market model cumulative abnormal return for days zero and plus one relative to restatement. The market model is estimated over a 250 trading day period ending on day -46 relative to restatement using value-weighted CRSP index of NYSE, AMEX, and NASDAQ companies. *CAR01* is more negative for both income decreasing and income increasing restatements and equals -9.39% and -6.79%, respectively. For income decreasing restatements, *CAR01* is more

[9] Badertscher, Phillips, Pincus and Rego (2009) calculate these variables either for the year for which the firm restates its financial statements or the year before that (see Appendix A).

negative for firms listed on NASDAQ (-11.01%) than for firms listed on NYSE or AMEX (-6.88%). For income increasing restatements, the opposite is true: *CAR01* is lower for NASDAQ firms and equals -6.40% compared with -7.93% for NYSE/AMEX firms.

<<< Insert Table 1 here >>>

I also report statistics for *NI_impact,* which measures the impact of restatement on net income. It is calculated as the difference between restated net income (summed over all periods) and originally reported net income (summed over all periods), divided by total assets one year prior to restatement announcement. The mean value of *NI_impact* equals -5.586 and the median equals -.038, suggesting substantial skewness. In absolute terms the magnitude of income decreasing restatements is much larger than the magnitude of income increasing restatements. For my sample the mean error period is about two years. Restating firms in my sample are fairly large with market capitalization of $2,243 million and total assets of $2,271 million, with the mean leverage of approximately 19%. Restating firms have negative mean and median return on assets.

5. Results

5.1. Trends in liquidity of restating firms

To test my hypotheses, I plot monthly *ILLIQ* for three periods associated with the restatement timeline: pre-error, error and post-restatement. I first calculate monthly *ILLIQ* for each firm as an average of daily numbers and then find the average of monthly numbers for each month across all firms. The graph also shows announcement period illiquidity calculated as an average over days 0 and +1, where day 0 is the day of

restatement announcement. It is marked with a line labeled "Restatement". For pre-error and post-restatement periods I depict *ILLIQ* for one year. Although the error period is firm-specific, I show trends in *ILLIQ* six months after mistake and six months before restatement for all sub-samples. Note that all three periods in Figures 2.1-2.3 are non-overlapping. If the error period of a firm is less than six months, the firm will have missing observations in respective parts of the error period.

Figure 2.1 shows trends in illiquidity for the full sample, which includes income decreasing restatements, income increasing restatements and restatements with zero impact on net income. It illustrates that illiquidity starts increasing six months prior to restatement and continues increasing for one year after restatement announcement. This pattern is particularly pronounced for restating firms listed on NASDAQ. For this sub-sample, there is a slight downward trend in illiquidity in pre-error period and the first six months of the error period. For NYSE/AMEX restating firms there is an increase in illiquidity several months before and four months after restatement. Figure 2.2 illustrates the illiquidity effects for income decreasing restatements. The graph is very similar to that for the full sample for firms listed on all exchanges, with the upward trend in illiquidity more pronounced after restatement announcement. Figure 2.3 shows that trends in illiquidity for income increasing restatements are different than for the full sample and for income decreasing restatements. Illiquidity exhibits much more volatility, which can potentially be attributed to smaller sample size. For NASDAQ firms, illiquidity increases one month before restatement, decreases at restatement announcement, and increases several months after restatement. For NYSE and AMEX

firms, illiquidity decreases in months -2 and -1 relative to restatement and increases in months +10, +11 and +12.

<<< Insert Figure 2 here >>>

Most studies on restatements analyze a fixed window around either a restatement or a mistake. However, the problem with such approach is that one mixes pre-error, error and post-restatement periods.[10] For example, Desai, Krishnamurthy and Venkataraman (2006) examine short interest 24 months before and after restatement announcement. However, the average length of the error period for NASDAQ restatements is only 1.5 years. Therefore, for many of these restatements 24 months window before restatement will include both the error and the pre-error period. To make my study comparable to prior literature, in Figure 3 I also show trends in illiquidity during longer fixed period prior to restatement: 18 months before restatement and 12 months after restatement. The results are very similar to those in Figure 2 but show less volatility in illiquidity prior to restatement announcement. Overall, trends in monthly *ILLIQ* provide preliminary support for hypotheses 1 and 2.

<<< Insert Figure 3 here >>>

Table 2 shows average *ILLIQ* for the following windows relative to restatement: months (-18; -7), months (-3, -1), month -1, restatement announcement (days 0, +1), and months (+1, +12). The results for the full sample and for income decreasing restatements listed on all exchanges are similar to those in Figures 2 and 3: illiquidity increases three months before restatement and one year after restatement relative to illiquidity in months (-18; -7). The increase is particularly significant one year after restatement relative to

[10] Note that my analysis in Figure 2 does not suffer from this problem and shows non-overlapping pre-error, error and post-restatement periods.

illiquidity before restatement (months (-18; -7)). It equals 97% for NASDAQ, 129% for NASDAQ income decreasing, 58% for NYSE/AMEX and 80% for NYSE/AMEX income decreasing restatements. For income increasing NASDAQ restatements illiquidity decreases during months (-3; -1) and at restatement announcement, and increases only 7% one month before restatement and one year after restatement. For income increasing NYSE/AMEX restatements illiquidity decreases in all periods relative to months (-18; -7).

<<< Insert Table 2 here >>>

To test whether trends in illiquidity shown in Figures 2.1-2.3, Figures 3.1-3.3 and Table 2 are statistically significant, I run a Fama McBeth (1973) type regression (Tables 3-5). First, for each firm I regress the log of *ILLIQ* on time dummies for the periods of interest. Then I average coefficients for all restatement specific regressions and use a t-test to examine their significance. The advantage of this approach is that it controls for cross-sectional correlation in residuals so that no single restatement drives the results. This approach does not suffer from the biases introduced by other approaches such as pooled OLS regression, in which firms with longer timelines can skew the results. A similar cross-sectional application of Fama McBeth (1973) regression is used by Coval and Shumway (2009) and Badertscher and Burks (2010).

Tables 3-5 present estimates for each restatement using daily data for one year before the error through one year after restatement. Separate analysis is performed for NASDAQ and NYSE/AMEX firms. Table 3 shows the results for the full sample of restatements. I find that for NASDAQ restatements illiquidity increases starting in month -3 relative to restatement (Table 3). The increase persists one year after restatement

announcement. NYSE/AMEX restatements show a decrease in illiquidity in month -3 and an increase in illiquidity in months +3 to +12 relative to restatement. This result suggests that information asymmetry increases for one year after restatement announcement. It complements findings of Wilson (2008), who shows that informational content of earnings response coefficients (ERCs) decreases only temporarily for two to three quarters after restatement announcement. The difference in the results can be attributed to Wilson analyzing firms that have sufficient analyst coverage data. Such firms are larger than those analyzed in my study and tend to have lower information asymmetry (Bowen, Chen and Cheng (2008)). Moreover, Wilson (2008) analyzes changes in ERC subsequent to restatement relative to ERC estimated five quarters before restatement announcement. However, as shown by Bardos, Golec and Harding (2010a), ERCs prior to restatement announcement are a function of mistake and therefore are not a reliable benchmark. Another possibility for the difference in results is that earnings response coefficients are calculated using potentially biased analyst forecasts, while my measure of information asymmetry is calculated using market data.

<<< Insert Table 3 here >>>

Tables 4 and 5 show separate analysis for income decreasing and income increasing restatements, respectively. Results for income decreasing restatements are very similar to those for the full sample. For NASDAQ income decreasing restatements illiquidity increases four months before restatement through one year after the restatement (Table 4). NYSE/AMEX income decreasing restatements exhibit decrease in illiquidity six months before restatement announcement. However, only coefficient on month -3 dummy is statistically significant at 10% level. For these firms illiquidity

increases starting one month after restatement announcement. This increase persists for the entire year following a restatement. For income increasing restatements none of the changes in illiquidity around restatement are statistically significant (Table 5).[11]

<<< Insert Tables 5 and 6 here >>>

Overall the results indicate that illiquidity increases prior to restatement and remains at elevated levels for many months after restatement announcement for income decreasing NASDAQ restatements, supporting hypotheses 1 and 2. For NYSE/AMEX firms illiquidity increases for eleven months starting one month after restatement announcement, supporting hypothesis 2. These results suggest that poor quality of financial information substantially increases information asymmetry among different groups of investors.

5.2. Cross-sectional analysis of changes in illiquidity of restating firms

In this section I examine cross-sectional variation in the changes of illiquidity around restatement announcement. Although any restatement may reveal lower quality of financial information, there are heterogeneous reasons for restatements and their impact on financial statements varies, potentially leading to heterogeneous implications for liquidity. I regress changes in illiquidity before restatement, at restatement announcement and after restatement on restatement characteristics and control variables.

First, I test whether changes in illiquidity are different for income decreasing and income increasing restatements by estimating the following model:

[11] In results not shown I also separately analyze annual and quarterly restatements. Annual restatements are those that amend at least one 10-K. Quarterly restatements amend only 10-Qs (Quarterly). I find that the results for annual and quarterly restatements are very similar.

Model 1: $\Delta ILLIQ_i^{Period\ p} = \alpha + \beta_1 \text{Income decreasing}_i + \Omega \text{Controls}_i + \varepsilon_i$ (2)

In this model *Income decreasing* is a dummy variable that equals one for income decreasing restatements and zero for income increasing restatements. Univariate and graph analysis indicates that income decreasing and income increasing restatements have different trends in illiquidity, with income decreasing restatements experiencing greater increase in illiquidity. Therefore, I expect positive coefficient on *Income decreasing* dummy.

Model 2 includes several restatement characteristics.[12]

Model 2: $\Delta ILLIQ_i^{Period\ p} = \alpha + \beta_1 \text{Revenue}_i + \beta_2 \text{SEC}_i + \beta_3 \text{Auditor}_i + \beta_4 \text{Annual}_i + \Omega \text{Controls}_i + \varepsilon_i$ (3)

I include an indicator variable *Revenue*, which equals one if restatement corrects revenue account. Prior literature suggests that market participants focus primarily on the revenue component of earnings (Ertimur, Livnat, and Martikainen (2003)). Revenue recognition restatements are associated with higher shareholder losses at restatement announcement (Palmrose, Richardson and Scholz (2004)) and longer loss of the information content of earnings (Wilson (2008)). Therefore, revenue recognition restatements can result in greater increase in information asymmetry. I also include two indicator variables for the party originating the restatement: *SEC* and *Auditor*, which equal one if the SEC or auditor originated the restatement, respectively. I use GAO (2002) dataset to identify prompter of the restatement. I expect that the effect on the illiquidity is more severe when an external party rather than the management itself

[12] This model excludes *Income decreasing* dummy because it can potentially be correlated with other restatement characteristics, such as *Revenue* and *Auditor*.

uncovers problems with financial statements. Palmrose, Richardson and Scholz (2004) find that market reaction to restatements is more severe for restatements originated by auditors. Lastly, I include a dummy variable *Annual*, which equals one if a restatement amended at least one 10-K. Since 10-Ks are externally audited, their restatement might be viewed as more serious and cause greater increases in information asymmetry. Moreover, the error period for annual restatements is longer than that for quarterly. I expect an annual restatement to result in greater increase in illiquidity.

I also estimate model with both *Income decreasing* dummy and restatement characteristics. A potential issue with this model is that some of restatement characteristics can be collinear with *Income decreasing* dummy.

Model 3: $$\Delta \text{ILLIQ}_i^{\text{Period p}} = \alpha + \beta_1 \text{Revenue}_i + \beta_2 \text{SEC}_i + \beta_3 \text{Auditor}_i + \beta_4 \text{Annual}_i$$

$$+ \beta_1 \text{Income decreasing}_i + \Omega \text{Controls}_i + \varepsilon_i \qquad (4)$$

I include the following control variables in all models: logarithm of price (*Price*), volatility of returns (*Std_return*) and market capitalization (*MarketCap*), since these variables have been shown to determine liquidity (Brockman, Chung, and Yan (2009)). For each variable I calculate time series averages for the period of interest. Table 6 presents descriptive statistics for these variables. In Panel A these variables are calculated as time series averages for the window of (-3; +1) months relative to restatement. In Panel B these variables are calculated as time series averages for a one year window after restatement announcement. *Log(Price)* and *Log(MarketCap)* decrease after restatement for both NASDAQ and NYSE/AMEX firms.

Table 7 estimates all three models for illiquidity three months before restatement. Specifically, the dependent variable is $ILLIQ^{3m\_before\_rest}$, which equals the difference of

the log of *ILLIQ* estimated three months before restatement and the log of *ILLIQ* estimated during the baseline period. The baseline period is a one year period prior to restatement ending six months before restatement announcement. *Price*, *Std_return* and *MarketCap* are estimated as time series averages for months -3 through month -1 relative to a restatement.

<<< Insert Table 7, Panel A here >>>

Consistent with univariate analysis, for NASDAQ restating firms I find that the coefficient on *Income decreasing* is positive and significant at 5% in Models 1 and 3, suggesting that income decreasing restatements result in greater illiquidity (Table 7). *Auditor* dummy is negative and marginally significant (at 6% level), suggesting that illiquidity increases less prior to restatement when it is originated by auditor. *Revenue, SEC* and *Annual* dummies are not significant at explaining cross-sectional variation in illiquidity three months before restatement for NASDAQ restatements. I find a smaller increase in illiquidity for firms with higher stock prices, while larger firms experience greater increase in illiquidity.

Table 7, Panel B shows the analysis of changes in illiquidity three months before restatement for NYSE/AMEX restatements. I find that there is little cross-sectional variation in illiquidity three months before restatement for NYSE/AMEX restatements. All restatement characteristics are insignificant in all models. The level of stock price is the only significant variable in all models. Coefficient on standard deviation of returns is positive and significant in Model 1.

<<< Insert Table 7, Panel B here >>>

I also examine cross-sectional determinants of changes in restatement announcement illiquidity relative to the baseline period, but find that none of restatement characteristics are significant (results not tabulated), suggesting no cross-sectional variation in announcement period illiquidity.

In Table 8 I report the analysis of cross-sectional variation in changes in illiquidity one year after restatement. The dependent variable is $ILLIQ^{1y\_after\_rest}$, which equals the difference of the log of *ILLIQ* estimated one year after restatement and the log of *ILLIQ* estimated during the baseline period. Panel A analyzes the sample of NASDAQ restatements. The coefficient on *Income decreasing* dummy is positive and significant at 7% level in Model 1. However, the coefficient on *Income decreasing* becomes insignificant in Model 3 potentially due to multicollinearity issues. I find that the coefficient on *Revenue* is positive and significant at 1% level in models 2 and 3, suggesting that revenue recognition restatements experience larger increase in illiquidity after restatement announcement. Coefficient on *Auditor* is negative and significant at 7% level in models 2 and 3. Larger firms with higher volatility of returns have greater increase in illiquidity as suggested by positive and significant coefficients on *log(MarketCap)* and *log(Std_return)*. The coefficient on *log(Price)* is negative, indicating that stocks with higher price experience smaller increase in illiquidity.

<<< Insert Table 8, Panel A here >>>

Table 8, Panel B shows the analysis for NYSE/AMEX firms. I continue to find that revenue restatements increase illiquidity more. However, for NYSE/AMEX firms restatements initiated by auditor do not result in lesser increase in illiquidity as suggested

by insignificant coefficient on *Auditor* dummy. All control variables are significant and have expected signs.

<<< Insert Table 8, Panel B here >>>

In alternative specifications instead of using *Income decreasing* dummy, I include *NI_impact,* which measures the impact of restatement on net income.[13] A restatement that has a greater impact on net income indicates poorer quality of previously reported financial statements, therefore potentially leading to greater increase in illiquidity. The estimated coefficient on this variable is not significant and the rest of the results are not affected. This suggests that it is the direction of the restatement and not the magnitude of its impact on net income that affects illiquidity before restatement.

Other characteristics of a restatement can capture its severity, some of which could be difficult to quantify. I account for such characteristics by including a two-day (0,+1) restatement announcement abnormal return, *CAR01*. *CAR01* should be more negative for more serious restatements. Therefore, there should be a negative association between *CAR01* and illiquidity. Since revenue recognition restatements have lower *CAR01*, I exclude *Revenue* dummy in specifications with *CAR01* to avoid multicollinearity. The coefficient on *CAR01* is not significant and the rest of the results are not affected.

Furthermore, I perform separate analysis for income decreasing and income increasing subsamples. For income decreasing restatements results are the same as for the full sample. For income increasing restatements, I find that the auditor dummy is no longer significant, while all control variables become significant in the analysis.

[13] Results are not tabulated.

Overall, cross-sectional analysis suggests that three months before restatement illiquidity is higher for income decreasing NASDAQ restatements and that there is no cross-sectional variation for NYSE/AMEX restatements. Restatements initiated by auditor experience less significant increase in illiquidity up to three months before restatement and one year after restatement for NASDAQ firms. Restatements correcting revenue increase illiquidity more during a one year period following a restatement for firms listed on all exchanges. Larger firms with higher volatility of returns have greater increase in illiquidity while stocks with higher price experience smaller increase.

6. Conclusion

This paper studies long-term changes in Amihud (2002) measure of illiquidity around restatement announcements. I separately analyze restatements that result in downward and upward revision of net income (income decreasing and income increasing restatements, respectively). I also analyze NASDAQ firms separately because they have higher trading costs than stocks listed on NYSE and AMEX.

I find that illiquidity increases several months prior to income decreasing restatements. This result is consistent with findings of Bardos, Golec and Harding (2010a), who show that investors detect poor earnings quality several months before restatement announcement. Income decreasing restatements experience increase in illiquidity at restatement announcement that persists for at least one year after restatement.

Cross-sectional analysis of the changes in illiquidity for NASDAQ restatements reveals that restatements originated by auditor result in lower changes in illiquidity both

before and after a restatement. Restatements that affect revenue recognition increase illiquidity more following restatement announcement for firms listed on all exchanges. Larger firms with higher volatility of returns have greater increase in illiquidity while stocks with higher price experience smaller increase in illiquidity.

Overall my results indicate that restatements result in long-term increase in information assymetry. My findings support SEC regulators' and market analysts' contention that restatements cause damage to long-term credibility of financial statements.

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Figure 2. Monthly mean ILLIQ in pre-error, error and post restatement periods

Figures 2.1-2.3 show monthly mean *ILLIQ* for the full sample, income decreasing and income increasing restatements, respectively. *ILLIQ* is Amihud (2002) measure of illiquidity, calculated as the absolute value of daily stock return divided by the daily dollar trading volume. *Income decreasing* (*income increasing*) restatements are defined as restatements that result in downward (upward) revision of net income. Solid line labeled "Mistake" indicates the beginning of the error period. The error period is defined as the period, which extends from the first misstated period to the day of restatement announcement. Solid line labeled "Restatement" corresponds to the day of and the day after restatement announcement (days 0 and +1). All other points show *ILLIQ* estimated over a one month period. I assume that there are 21 trading days in one month.

Figure 2.1. Monthly mean ILLIQ for the full sample

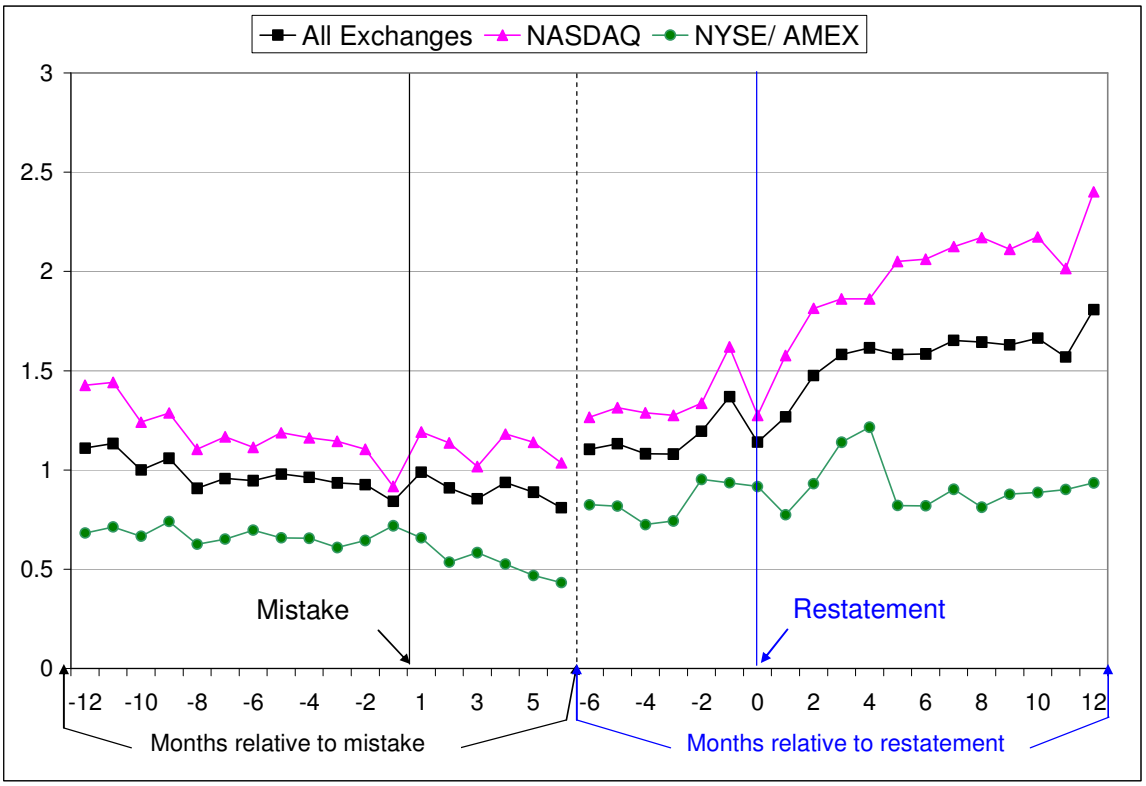

Figure 2.2. Monthly mean ILLIQ for income decreasing restatements

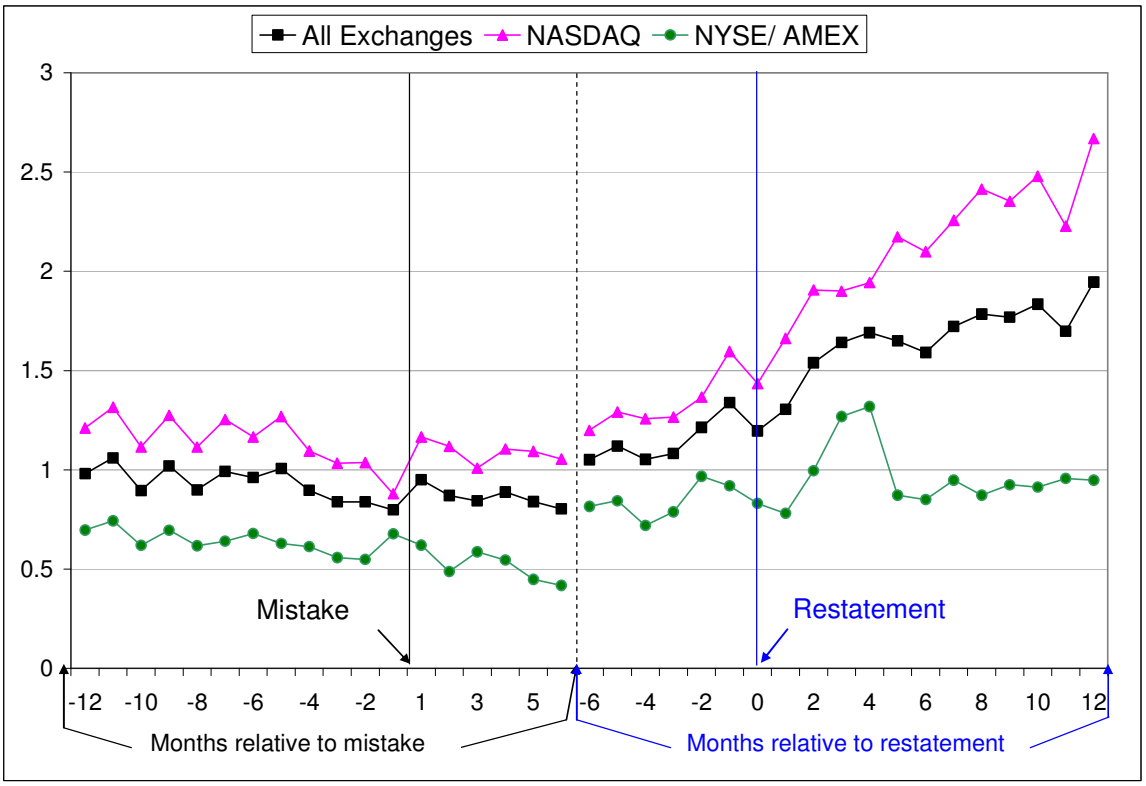

Figure 2.3. Monthly mean ILLIQ for income increasing restatements

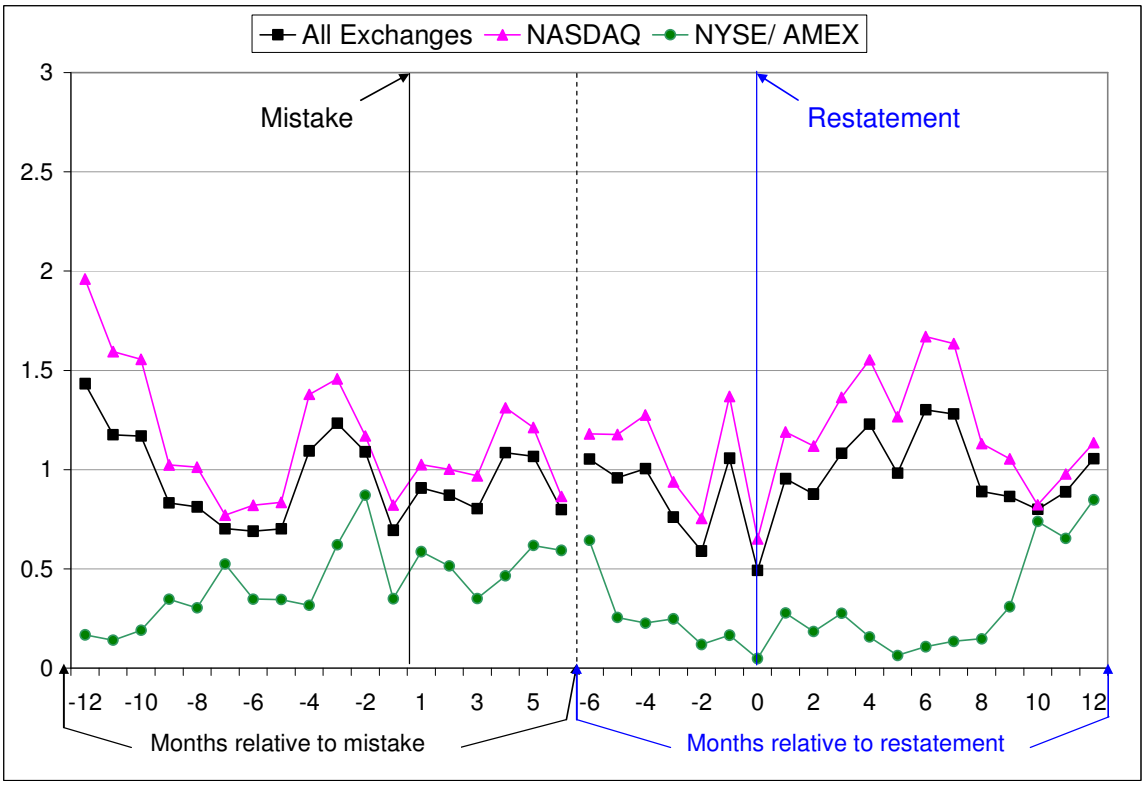

Figure 3. Monthly mean ILLIQ 18 months before and 12 months after restatement

Figures 3.1-3.3 show monthly mean *ILLIQ* for the full sample, income decreasing and income increasing restatements, respectively. *ILLIQ* is Amihud (2002) measure of illiquidity, calculated as the absolute value of daily stock return divided by the daily dollar trading volume. *Income decreasing* (*income increasing*) restatements are defined as restatements that result in downward (upward) revision of net income. Solid line labeled "Restatement" corresponds to the day of and the day after restatement announcement (days 0 and +1). All other points show *ILLIQ* estimated over a one month period. I assume that there are 21 trading days in one month.

Figure 3.1. Monthly mean ILLIQ for the full sample

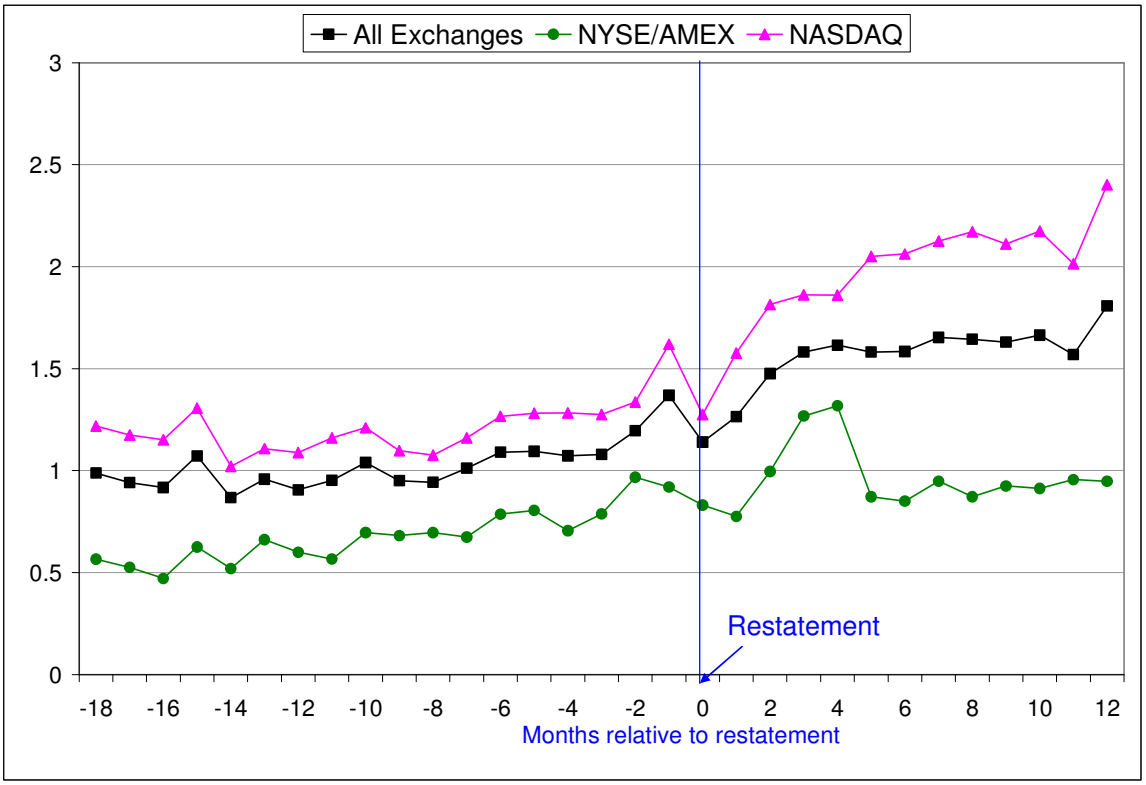

Figure 3.2. Monthly mean ILLIQ for income decreasing restatements

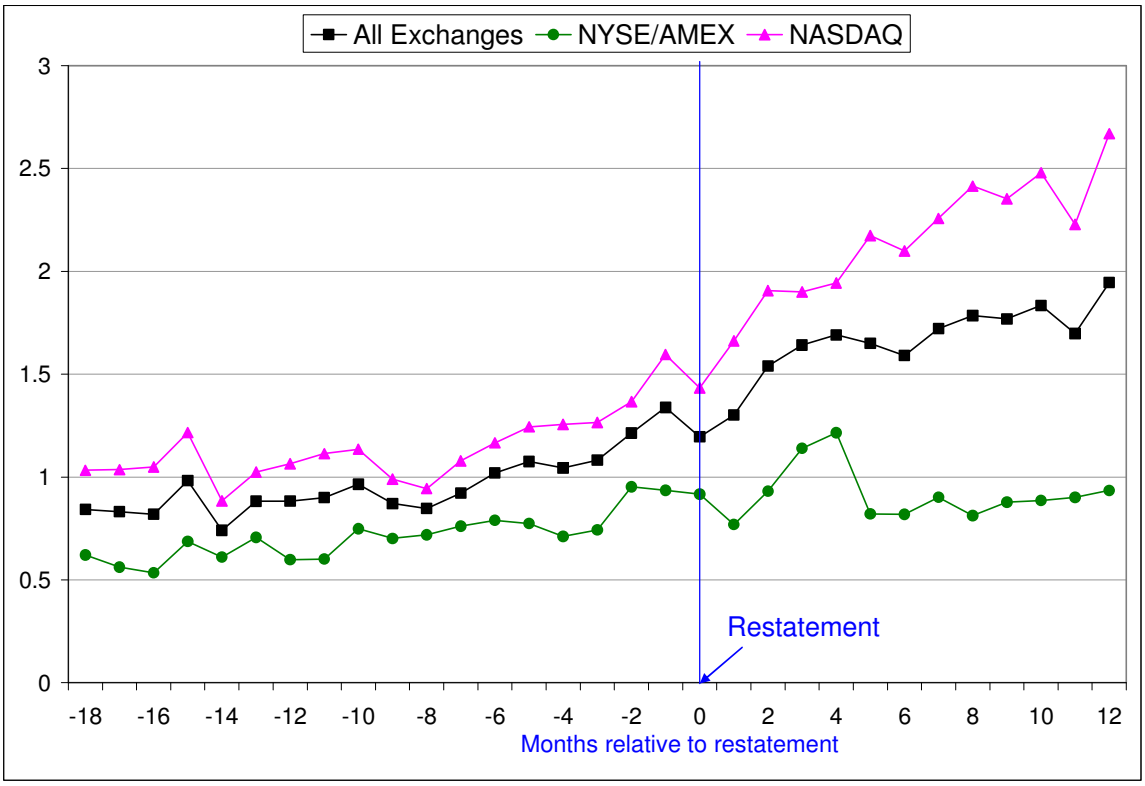

Figure 3.3. Monthly mean ILLIQ for income increasing restatements

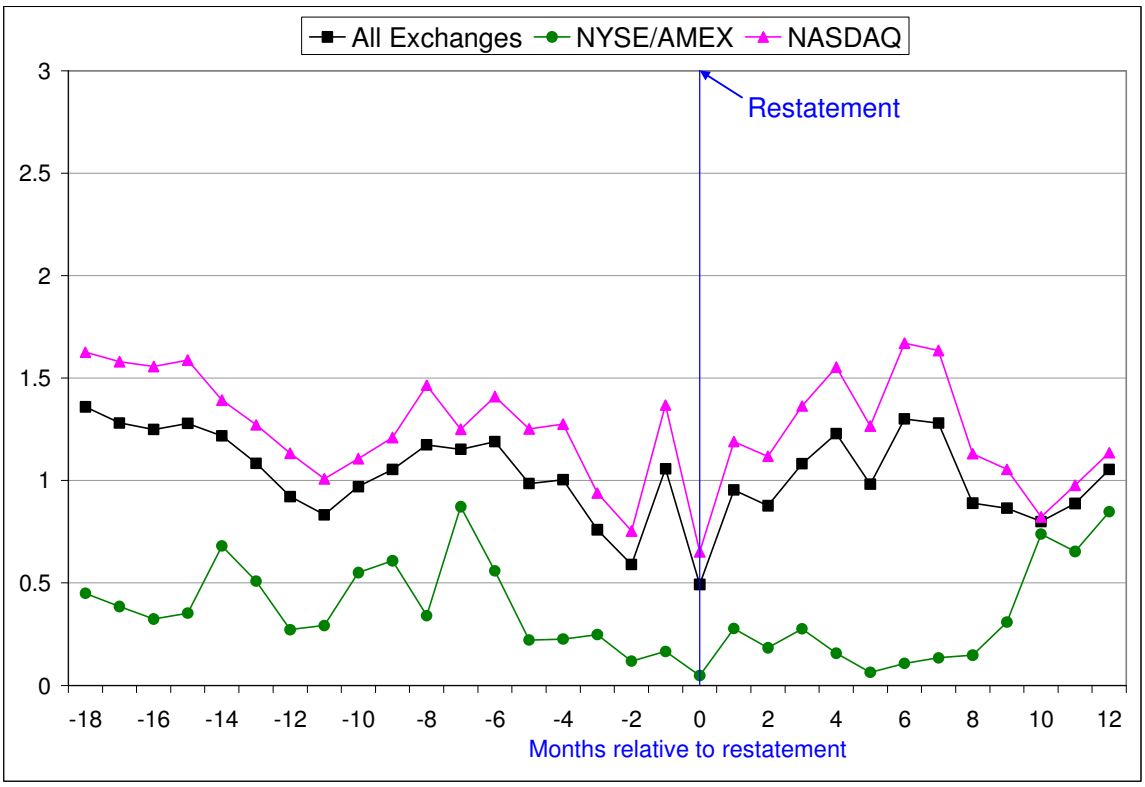

Table 1. Sample description

This table shows descriptive statistics for a sample of restating firms made between January 1, 1997 and June 30, 2002. *Annual* restatements include a restatement of at least one annual (audited) report. *Quarterly* restatements are defined as restatements of quarterly financial statements only and no restatement of an annual (audited) report. *Income decreasing* (*income increasing*) restatements are defined as restatements that result in downward (upward) revision of net income. *Revenue* is a dummy variable that equals one if revenue account was restated. *Auditor* and *SEC* are dummy variables that equal one if restatements were initiated by auditor or SEC, respectively. *CAR01* is a market model cumulative abnormal return for days zero and plus one relative to a restatement announcement. Market model parameters are estimated over a 250 day period starting on day -46 relative to restatement using value weighted market index. *NI_impact* is the difference between restated net income (summed over all periods) and originally reported net income (summed over all periods), divided by total assets one year prior to restatement announcement. *Lengths of the error period* is the number of years spanned by the error period. Error period extends from the first misstated period to the date of restatement announcement. *MarketCap* is the market value of equity calculated as stock price multiplied by number of shares outstanding. *Total Assets* is the total assets as reported on the balance sheet. *Leverage* is the value of long term debt divided by total assets. *ROA* is the return on assets, calculated as net income divided by total assets. *MarketCap, Total Assets, Leverage* and *ROA* are reported at year end prior to announcement.

Panel A: Distribution of restatements by year and exchange

* For 2002 restatements were collected only through June 30, 2002 so that all restatements in the sample precede Sarbanes-Oxley Act.

Year	All Exchanges	NASDAQ	NASDAQ as a %	NYSE/AMEX	NYSE/AMEX as a %
1997	58	38	65.5%	20	34.5%
1998	61	41	67.2%	20	32.8%
1999	105	61	58.1%	44	41.9%
2000	105	73	69.5%	32	30.5%
2001	73	48	65.8%	25	34.2%
2002*	66	32	48.5%	34	51.5%
Total	468	293	62.6%	175	37.4%

Table 1 (continued). Sample description

Panel B: Types of restatements

	Full Sample	As a %	NASDAQ	As a %	NYSE/ AMEX	As a%
Annual	300	64.10%	187	63.82%	113	64.57%
Quarterly	168	35.90%	106	36.18%	62	35.43%
Income decreasing	390	83.30%	239	81.57%	151	86.29%
Income increasing	59	12.60%	43	14.68%	16	9.14%
Zero impact on NI	19	4.10%	11	3.75%	8	4.57%
Income decreasing annual	247	52.80%	150	51.19%	97	55.43%
Income decreasing quarterly	143	30.60%	89	30.38%	54	30.86%
Income increasing annual	39	8.30%	28	9.56%	11	6.29%
Income increasing quarterly	20	4.30%	15	5.12%	5	2.86%
Revenue						
Full sample	150	32.05%	100	34.13%	50	28.57%
Income decreasing	137	35.13%	92	38.49%	45	29.80%
Income increasing	7	11.86%	4	9.30%	3	18.75%
Auditor						
Full sample	38	8.12%	24	8.19%	14	8.00%
Income decreasing	35	8.97%	21	8.79%	14	9.27%
Income increasing	2	3.39%	2	4.65%	0	0.00%
SEC						
Full sample	91	19.44%	50	17.06%	41	23.43%
Income decreasing	55	14.10%	25	10.46%	30	19.87%
Income increasing	31	52.54%	22	51.16%	9	56.25%

Table 1 (continued). Sample description

Panel C: Restatement and firm characteristics

	All Exchanges				NASDAQ firms				NYSE/AMEX firms			
	Mean	Median	Std	N	Mean	Median	Std	N	Mean	Median	Std	N
CAR01												
Full sample	-8.97%	-4.05%	17.55%	446	-10.17%	-5.69%	18.93%	279	-6.96%	-2.42%	14.81%	167
Income decreasing	-9.39%	-4.13%	18.28%	370	-11.01%	-6.12%	19.91%	225	-6.88%	-2.42%	15.13%	145
Income increasing	-6.79%	-3.62%	13.83%	58	-6.40%	-4.23%	14.20%	43	-7.93%	-3.57%	13.10%	15
NI_impact												
Full sample	-5.586	-0.038	78.795	448	-4.167	-0.055	65.278	282	-7.997	-0.025	97.741	166
Income decreasing	-6.790	-0.060	86.560	371	-5.210	-0.100	72.430	229	-9.350	-0.040	105.670	142
Income increasing	0.315	0.059	0.695	58	0.429	0.164	0.790	42	0.017	0.008	0.031	16
Lengths of the error period (in years)												
Full sample	1.91	1.62	1.22	468	1.73	1.53	1.01	293	2.20	1.93	1.47	175
Income decreasing	1.89	1.61	1.22	390	1.71	1.41	1.01	239	2.19	1.92	1.45	151
Income increasing	1.97	1.84	1.24	59	1.81	1.81	0.92	43	2.42	2.16	1.81	16
MarketCap (in millions)												
Full sample	2,243	180	9,370	444	1,041	91	7,338	280	4,295	621	11,820	164
Income decreasing	2,325	160	10,029	368	1,060	85	7,982	227	4,362	599	12,411	141
Income increasing	2,083	287	5,692	58	901	177	3,617	42	5,185	1,974	8,555	16
Total assets (in millions)												
Full sample	2,271	222	8,578	448	772	95	5,742	282	4,817	1,243	11,525	166
Income decreasing	2,287	222	8,851	371	884	91	6,364	229	4,549	1,154	11,478	142
Income increasing	2,591	210	8,088	58	273	123	547	42	8,675	4,079	13,902	16
Leverage												
Full sample	0.1857	0.1427	0.2013	446	0.1438	0.0547	0.1969	281	0.2571	0.2290	0.1888	165
Income decreasing	0.1883	0.1463	0.1893	370	0.1461	0.0664	0.1793	229	0.2568	0.2473	0.1857	141
Income increasing	0.1943	0.0913	0.2830	57	0.1429	0.0161	0.2905	41	0.3258	0.2564	0.2198	16
ROA												
Full sample	-0.1560	-0.0056	0.4858	448	-0.2192	-0.0376	0.5837	282	-0.0485	0.0115	0.2020	166
Income decreasing	-0.1685	-0.0094	0.5223	371	-0.2395	-0.0429	0.6336	229	-0.0540	0.0105	0.2129	142
Income increasing	-0.1001	-0.0007	0.2383	58	-0.1329	-0.0319	0.2686	42	-0.0141	0.0140	0.0883	16

Table 2. Descriptive statistics of illiquidity around restatements

This table shows descriptive statistics for *ILLIQ* for selected windows around restatement. *ILLIQ* is Amihud's (2002) measure of illiquidity and is defined as the absolute value of daily stock return, divided by the daily dollar trading volume (see equation (1)). *Income decreasing* (*income increasing*) restatements are defined as restatements that result in downward (upward) revision of net income.

	Mean	Median	Std	N
Full sample (NASDAQ)				
Months (-18; -7) relative to restatement	1.094	0.150	2.158	288
Months (-3, -1) relative to restatement	1.392	0.181	2.854	293
Month -1 relative to restatement	1.619	0.163	3.519	293
Restatement announcement (days 0, +1)	1.275	0.105	3.798	275
Months (+1, +12) relative to restatement	2.162	0.625	3.692	280
Full sample (NYSE/AMEX)				
Months (-18; -7) relative to restatement	0.625	0.011	1.989	173
Months (-3, -1) relative to restatement	0.893	0.011	3.163	170
Month -1 relative to restatement	0.935	0.011	3.412	169
Restatement announcement (days 0, +1)	0.917	0.008	4.161	167
Months (+1, +12) relative to restatement	0.988	0.022	3.146	171
Income decreasing restatements (NASDAQ)				
Months (-18; -7) relative to restatement	1.001	0.163	1.918	234
Months (-3, -1) relative to restatement	1.394	0.209	2.740	239
Month -1 relative to restatement	1.596	0.207	3.362	239
Restatement announcement (days 0, +1)	1.434	0.121	4.153	222
Months (+1, +12) relative to restatement	2.297	0.698	3.847	226
Income decreasing restatements (NYSE/AMEX)				
Months (-18; -7) relative to restatement	0.587	0.011	1.879	150
Months (-3, -1) relative to restatement	0.911	0.012	3.197	148
Month -1 relative to restatement	0.920	0.012	3.278	147
Restatement announcement (days 0, +1)	0.831	0.008	3.638	145
Months (+1, +12) relative to restatement	1.054	0.024	3.314	149
Income increasing restatements (NASDAQ)				
Months (-18; -7) relative to restatement	1.281	0.066	2.453	43
Months (-3, -1) relative to restatement	0.992	0.06	2.317	43
Month -1 relative to restatement	1.369	0.052	3.756	43
Restatement announcement (days 0, +1)	0.651	0.068	1.583	42
Months (+1, +12) relative to restatement	1.365	0.121	2.063	43
Income increasing restatements (NYSE/AMEX)				
Months (-18; -7) relative to restatement	0.441	0.002	1.54	15
Months (-3, -1) relative to restatement	0.178	0.001	0.427	15
Month -1 relative to restatement	0.166	0.001	0.436	15
Restatement announcement (days 0, +1)	0.048	0.001	0.096	15
Months (+1, +12) relative to restatement	0.293	0.003	0.801	15

Table 3. Illiquidity around restatements (full sample)

This table presents mean coefficients across firm specific time series regressions of daily *log(ILLIQ)* on time dummies. *ILLIQ* is Amihud's (2002) measure of illiquidity and is defined as the absolute value of daily stock return, divided by the daily dollar trading volume (see equation (1)). The model is estimated for each restatement using daily data for one year before mistake through one year after restatement. I include time dummies for each month 6 months before restatement and 12 months after restatement. I assume that there are 21 trading days in one month. *, **, and *** indicates significance at 10%, 5% and 1%, respectively.

	NASDAQ restatements				NYSE/AMEX restatements			
Time dummies	Mean	t-value	Pr>|t|	N	Mean	t-value	Pr>|t|	N
Intercept	-2.627	-19.25***	<0.01	294	-4.434	-21.26***	<0.01	174
Month BEFORE restatement								
-6	0.087	1.12	0.26	290	-0.063	-0.79	0.43	170
-5	0.082	1.01	0.31	291	-0.054	-0.66	0.51	170
-4	0.118	1.45	0.15	292	-0.131	-1.59	0.11	170
-3	0.156	1.90*	0.06	293	-0.146	-1.68*	0.09	170
-2	0.195	2.17**	0.03	293	-0.136	-1.52	0.13	170
-1	0.358	3.82***	<0.01	293	-0.014	-0.15	0.88	169
Restatement announcement (days 0, +1)	0.371	3.31***	<0.01	270	-0.110	-0.99	0.33	164
Month AFTER restatement								
+1	0.585	5.54***	<0.01	268	0.042	0.41	0.69	168
+2	0.788	7.12***	<0.01	266	0.175	1.61	0.11	165
+3	0.831	7.50***	<0.01	257	0.233	1.88*	0.06	163
+4	0.817	7.11***	<0.01	255	0.216	1.69*	0.09	157
+5	0.787	6.57***	<0.01	247	0.170	1.32	0.19	152
+6	0.798	6.29***	<0.01	241	0.308	2.40**	0.02	151
+7	0.863	6.59***	<0.01	238	0.350	2.55***	0.01	150
+8	0.886	6.54***	<0.01	232	0.328	2.38**	0.02	147
+9	0.862	6.23***	<0.01	228	0.399	2.81***	0.01	146
+10	0.894	6.47***	<0.01	223	0.322	2.31**	0.02	145
+11	0.814	5.66***	<0.01	217	0.304	2.12*	0.04	145
+12	0.927	6.35***	<0.01	210	0.265	1.71*	0.09	144

Table 4. Illiquidity around income decreasing restatements

This table presents mean coefficients across firm specific time series regressions of daily *log(ILLIQ)* on time dummies. *ILLIQ* is Amihud's (2002) measure of illiquidity and is defined as the absolute value of daily stock return, divided by the daily dollar trading volume (see equation (1)). The model is estimated for each restatement using daily data for one year before mistake through one year after restatement. I include time dummies for each month 6 months before restatement and 12 months after restatement. I assume that there are 21 trading days in one month. *Income decreasing* (*income increasing*) restatements are defined as restatements that result in downward (upward) revision of net income. *, **, and *** indicates significance at 10%, 5% and 1%, respectively.

	NASDAQ restatements				NYSE/AMEX restatements			
Time dummies	Mean	t-value	Pr>|t|	N	Mean	t-value	Pr>|t|	N
Intercept	-2.548	-17.46***	<0.01	240	-4.416	-19.72***	<0.01	150
Month BEFORE restatement								
-6	0.118	1.42	0.16	236	-0.075	-0.91	0.36	148
-5	0.081	0.92	0.36	237	-0.040	-0.48	0.63	148
-4	0.152	1.78*	0.08	238	-0.123	-1.46	0.15	148
-3	0.227	2.61***	0.01	239	-0.149	-1.71*	0.09	148
-2	0.290	3.06***	<0.01	239	-0.134	-1.44	0.15	148
-1	0.471	4.88***	<0.01	239	-0.003	-0.03	0.98	147
Restatement announcement (days 0, +1)	0.499	4.18***	<0.01	218	-0.098	-0.86	0.39	142
Month AFTER restatement								
+1	0.712	6.33***	<0.01	214	0.049	0.46	0.65	146
+2	0.960	8.18***	<0.01	212	0.192	1.69*	0.09	143
+3	1.011	8.51***	<0.01	204	0.244	1.93*	0.06	141
+4	0.986	8.08***	<0.01	202	0.242	1.82*	0.07	137
+5	0.968	7.45***	<0.01	196	0.196	1.43	0.16	132
+6	0.984	6.97***	<0.01	190	0.332	2.42**	0.02	131
+7	1.040	7.07***	<0.01	188	0.351	2.38**	0.02	130
+8	1.112	7.52***	<0.01	184	0.334	2.23**	0.03	127
+9	1.086	7.33***	<0.01	182	0.416	2.68***	0.01	126
+10	1.144	7.64***	<0.01	180	0.320	2.19**	0.03	125
+11	1.034	6.55***	<0.01	175	0.323	2.13**	0.03	125
+12	1.173	7.19***	<0.01	169	0.297	1.82*	0.07	124

Table 5. Illiquidity around income increasing restatements

This table presents mean coefficients across firm specific time series regressions of daily *log(ILLIQ)* on time dummies. *ILLIQ* is Amihud's (2002) measure of illiquidity and is defined as the absolute value of daily stock return, divided by the daily dollar trading volume (see equation (1)). The model is estimated for each restatement using daily data for one year before mistake through one year after restatement. I include time dummies for each month 6 months before restatement and 12 months after restatement. I assume that there are 21 trading days in one month. *Income decreasing* (*income increasing*) restatements are defined as restatements that result in downward (upward) revision of net income. *, **, and *** indicates significance at 10%, 5% and 1%, respectively.

	NASDAQ restatements				NYSE/AMEX restatements			
Time dummies	Mean	t-value	Pr>|t|	N	Mean	t-value	Pr>|t|	N
Intercept	-3.022	-7.74***	<0.01	43	-5.114	-7.30***	<0.01	16
Month BEFORE restatement								
-6	-0.019	-0.08	0.94	43	0.067	0.20	0.84	15
-5	0.099	0.40	0.69	43	-0.139	-0.37	0.72	15
-4	0.015	0.06	0.96	43	-0.053	-0.17	0.87	15
-3	-0.133	-0.51	0.61	43	-0.027	-0.07	0.95	15
-2	-0.299	-1.06	0.30	43	-0.144	-0.39	0.71	15
-1	-0.231	-0.76	0.45	43	0.011	0.03	0.98	15
Restatement announcement (days 0, +1)	-0.267	-0.83	0.41	42	-0.128	-0.29	0.78	15
Month AFTER restatement								
+1	0.018	0.06	0.95	43	0.090	0.21	0.84	15
+2	0.084	0.27	0.79	43	0.117	0.26	0.80	15
+3	0.275	0.89	0.38	43	0.263	0.46	0.65	15
+4	0.400	1.21	0.23	43	-0.026	-0.05	0.96	13
+5	0.142	0.43	0.67	42	-0.084	-0.19	0.85	13
+6	0.152	0.48	0.63	42	-0.070	-0.17	0.87	13
+7	0.205	0.66	0.51	42	0.124	0.30	0.77	13
+8	0.001	0.00	1.00	40	0.096	0.21	0.84	13
+9	-0.010	-0.03	0.98	38	0.178	0.38	0.71	13
+10	-0.101	-0.28	0.78	35	0.368	0.60	0.56	13
+11	-0.061	-0.16	0.87	34	0.181	0.29	0.78	13
+12	-0.056	-0.16	0.87	33	0.039	0.06	0.96	13

Table 6. Descriptive statistics for control variables for cross-sectional analysis

This table shows descriptive statistics for control variables used in cross-sectional analysis of changes in illiquidity. *Log(Price)* is the natural logarithm of daily stock price averaged over the period of interest. *Log(Std_return)* is the natural logarithm of volatility of daily stock returns averaged over the period of interest. *Log(MarketCap)* is the natural logarithm of market capitalization averaged over the period of interest. Variables in Panel A are averaged over months (-3; -1) relative to restatement. Variables in Panel B are averaged over months (+1; +12) relative to a restatement. I assume that there are 21 trading days in one month.

Panel A: Months (-3, -1) relative to restatement

	Mean	Median	Std	N
NASDAQ				
Log (Price)	1.88	1.94	1.09	286
Log (Std_return)	-2.96	-2.94	0.51	293
Log (MarketCap)	11.41	11.38	1.68	286
NYSE/ AMEX				
Log (Price)	2.63	2.84	1.18	168
Log (Std_return)	-3.41	-3.44	0.54	170
Log (MarketCap)	13.36	13.42	2.21	168

Panel B: Months (+1, +12) relative to restatement

	Mean	Median	Std	N
NASDAQ				
Log (Price)	1.36	1.40	1.31	277
Log (Std_return)	-2.75	-2.76	0.58	279
Log (MarketCap)	10.93	10.75	1.83	277
NYSE/ AMEX				
Log (Price)	2.29	2.51	1.34	170
Log (Std_return)	-3.22	-3.29	0.66	170
Log (MarketCap)	13.04	13.01	2.31	170

Table 7. Cross-sectional determinants of changes in illiquidity before restatement announcement

This table shows cross sectional analysis of $ILLIQ^{3m\_before\_rest}$, which equals the difference of the log of *ILLIQ* estimated for months -3 through -1 before restatement and the log of *ILLIQ* estimated during the baseline period. The baseline period is a one year period prior to restatement ending six months before restatement announcement. *ILLIQ* is Amihud's (2002) measure of illiquidity and is defined as the absolute value of daily stock return, divided by the daily dollar trading volume (see equation (1)). See Tables 1 and 6 for definition of explanatory variables. *Price, Std_return* and *MarketCap* are estimated during months (-3, -1) relative to restatement. *, **, and *** indicates significance at 10%, 5% and 1%, respectively.

Panel A: NASDAQ restatements

	Model 1			Model 2			Model 3		
	Coefficient	t-value	Pr<|t|	Coefficient	t-value	Pr<|t|	Coefficient	t-value	Pr<|t|
Intercept	-1.444	-1.65*	0.10	-1.046	-1.22	0.22	-1.449	-1.65*	0.10
Income decreasing	0.371	1.96**	0.05				0.407	1.96**	0.05
Revenue				0.108	0.73	0.47	0.062	0.42	0.68
SEC				-0.062	-0.32	0.75	0.080	0.39	0.70
Auditor				-0.471	-1.88*	0.06	-0.470	-1.88*	0.06
Annual				0.142	0.98	0.33	0.139	0.96	0.34
Log (Price)	-0.956	-8.71***	<0.01	-0.963	-8.68***	<0.01	-0.960	-8.70***	<0.01
Log (Std_return)	0.123	0.80	0.43	0.152	0.97	0.33	0.148	0.95	0.34
Log (MarketCap)	0.294	4.32***	<0.01	0.288	4.20***	<0.01	0.291	4.27***	<0.01
N	271			271			271		
Adjusted R-square	32.26%			31.71%			32.44%		
F	33.14			18.91			17.21		
Pr>F	<0.01			<0.01			<0.01		

Panel B: NYSE/AMEX restatements

	Model 1			Model 2			Model 3		
	Coefficient	t-value	Pr<|t|	Coefficient	t-value	Pr<|t|	Coefficient	t-value	Pr<|t|
Intercept	0.975	1.41	0.16	0.971	1.44	0.15	0.956	1.34	0.18
Income decreasing	-0.026	-0.13	0.89				0.012	0.06	0.95
Revenue				0.074	0.57	0.57	0.074	0.57	0.57
SEC				0.127	0.88	0.38	0.130	0.87	0.39
Auditor				0.003	0.02	0.99	0.003	0.01	0.99
Annual				-0.081	-0.66	0.51	-0.081	-0.66	0.51
Log (Price)	-0.339	-3.43***	<0.01	-0.344	-3.36***	<0.01	-0.345	-3.35***	<0.01
Log (Std_return)	0.220	1.68*	0.09	0.200	1.49	0.14	0.200	1.48	0.14
Log (MarketCap)	0.051	1.09	0.28	0.045	0.92	0.36	0.045	0.92	0.36
N	161			161			161		
Adjusted R-square	22.24%			21.44%			20.93%		
F	12.44			7.24			6.29		
Pr>F	<0.01			<0.01			<0.01		

Table 8. Cross-sectional determinants of changes in illiquidity after restatement announcement

This table shows cross sectional analysis $ILLIQ^{1y\_after\_rest}$, which equals the difference of the log of *ILLIQ* estimated one year after restatement and the log of *ILLIQ* estimated during the baseline period. The baseline period is a one year period prior to restatement ending six months before restatement announcement. *ILLIQ* is Amihud's (2002) measure of illiquidity and is defined as the absolute value of daily stock return, divided by the daily dollar trading volume (see equation (1)). See Tables 1 and 6 for definition of explanatory variables. *Price, Std_return* and *MarketCap* are estimated during months (+1, +12) relative to restatement. *, **, and *** indicates significance at 10%, 5% and 1%, respectively.

Panel A: NASDAQ restatements

	Model 1			Model 2			Model 3		
	Coefficient	t-value	Pr<|t|	Coefficient	t-value	Pr<|t|	Coefficient	t-value	Pr<|t|
Intercept	-0.604	-0.63	0.53	-0.263	-0.28	0.78	-0.553	-0.58	0.56
Income decreasing	0.412	1.81*	0.07				0.324	1.32	0.19
Revenue				0.496	2.79***	0.01	0.452	2.50***	0.01
SEC				-0.014	-0.06	0.95	0.087	0.37	0.71
Auditor				-0.537	-1.82*	0.07	-0.537	-1.83*	0.07
Annual				-0.030	-0.18	0.86	-0.035	-0.20	0.84
Log (Price)	-1.090	-8.99***	<0.01	-1.102	-9.16***	<0.01	-1.092	-9.08***	<0.01
Log (Std_return)	0.453	2.57***	0.01	0.417	2.35**	0.02	0.429	2.42**	0.02
Log (MarketCap)	0.362	4.75***	<0.01	0.346	4.56***	<0.01	0.35	4.61***	<0.01
N	260			260			260		
Adjusted R-square	45.44%			46.53%			46.69%		
F	54.92			33.20			29.35		
Pr>F	<0.01			<0.01			<0.01		

Panel B: NYSE/AMEX restatements

	Model 1			Model 2			Model 3		
	Coefficient	t-value	Pr<|t|	Coefficient	t-value	Pr<|t|	Coefficient	t-value	Pr<|t|
Intercept	1.593	1.77*	0.08	1.478	1.76*	0.08	1.388	1.53	0.13
Income decreasing	0.144	0.52	0.61				0.077	0.27	0.79
Revenue				0.356	1.99**	0.05	0.354	1.97**	0.05
SEC				-0.167	-0.81	0.42	-0.154	-0.73	0.47
Auditor				-0.121	-0.40	0.69	-0.125	-0.41	0.68
Annual				-0.214	-1.25	0.21	-0.215	-1.25	0.21
Log (Price)	-0.607	-4.68***	<0.01	-0.634	-4.90***	<0.01	-0.636	-4.89***	<0.01
Log (Std_return)	0.607	3.47***	0.00	0.581	3.33***	<0.01	0.579	3.31***	<0.01
Log (MarketCap)	0.160	2.61***	0.01	0.184	2.92***	<0.01	0.185	2.93***	<0.01
N	162			162			162		
Adjusted R-square	43.07%			44.40%			44.06%		
F	31.55			19.36			16.85		
Pr>F	<0.01			<0.01			<0.01		