An analysis of institutional trading activities around Quantitative Easing policy release

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ABSTRACT

An analysis of institutional trading activities around specific public news release

Cong Zhou

This paper explores the trading behavior of institutional traders vis-à-vis the rest of the market in the US, around the Quantitative Easing announcements (also known as QE1, QE2). The objective is to identify if institutional traders display any advantage over the rest of the market, through their trading behavior around highly publicized news events. While better information in the form of access to non-public information is unlikely in this case, institutional traders could generate private benefits through superior ability to process public news releases. This could potentially allow them to better time the market around the actual event.

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Introduction

Quantitative Easing policy was first adopted by the central bank of Japan to fight against economic downturns and deflation in 2000s. The policy was regarded as an unconventional financial policy when interest rate can no longer be lowered. By purchasing government bonds, corporate bonds from commercial banks and other financial institutions in the open market, the goal is inject money into the market and stimulate the economy.

Ever since the 2008 global financial crisis, Quantitative Easing policy(hereafter, also known as QE policy) has been implemented in countries, the United States, the United Kingdom as well as the Eurozone to help increase market dynamics and stimulate economic growth.

Starting from November 25,2008, Federal Reserve chairman Ben Bernanke announced the first round of QE policy, hereafter, also known as QE phase 1(QE1 in short). The primary purpose was to rescue the devastated housing market caused by 2008 subprime mortgage crisis and boost the economy. Since November 2008, the central bank started buying $600 billion in MBS (mortgaged backed securities), and $100 million in debt, all of which were backed by Fannie Mae, Freddie Mac, Ginnie Mae and the Federal Home Loan Banks. Further purchase was extended in March 2009. Till the end of QE1, the Fed purchased a total of $1.25 trillion dollar worth of MBS, debt, and $300 billion in Treasury securities. However, under the condition that the market and the economy weren't bouncing back effectively, the Fed continued with another round of QE in

August 2010, hereafter also known as QE phase 2(QE2 in short) between November 2010 and June 2011.During QE2, the central bank purchased 600 billion dollars of longer dated treasuries which aimed to increase market liquidity and create more economic activities.

In this paper, the objective is to examine the trading activity of institutions around QE1 and QE2. First, it would be of interest to investigate the effectiveness of such costly monetary intervention policy on whether it could increase market dynamics and boost the economy as intended. Secondly, our research would shed light on analyzing which group actually benefits from trading during the event window of such public news release; if institutions have either information advantages towards such public news or better information processing skills to take advantage by comparing the trading activities of institutional investors and retail investors, in the form of obtaining and comparing number of trades' imbalances, trade volume imbalances and dollar value trade imbalances of the two groups. Furthermore, it is also important to investigate which factors could explain the abnormal trading imbalances during the event window such as macro-economic factors, market return, market volatility, market sentiment, among others. Finally, Granger causality tests should show the relationship among the Under the condition that the interest rate is already close or equal to zero, such unconventional monetary policy is adopted by the central banks in methods of buying financial assets from commercial banks and other private institutions to create and inject money to the market. contemporaneous market, institutional trading imbalances, as well as their lagged terms respectively.

Our main findings proceed as follows: First, the comparison of three different measurements, number of trades' imbalances, trade volume imbalances and dollar value trade volume imbalances between the institutions and the market during event window (-40, +40) demonstrate that in general the releases of Quantitative Easing Policy stimulate and boost the market positively; the market reacts rapidly on the announcement day, and then quickly calms down post event which indicates that the information content of such public news release is quickly absorbed by the market. In terms of the institutions, they did not seem to react aggressively with large amount of share purchase on the event day towards the QE release. In contrast, institutions merely fulfilled a role as liquidity providers to the rest of the market. Furthermore, we find there is a significant negative relationship between contemporaneous institutional trading imbalances and the contemporaneous market returns. The result is inconsistent with prior research in Chordia, Roll and Subrahmanyam(2002) who analyzes the aggregate daily order imbalance on the NYSE and find that order imbalances are significantly associated with daily changes in liquidity and with contemporaneous market returns, after controlling for volume. Our results suggest that order imbalance increases following market declines and vice versa. Finally, Granger causality tests among the contemporaneous market, institutional trading imbalances, as well as their lagged terms illustrate a uni-directional statistically positive relationship between contemporaneous institutional trade imbalance and lagged day one market trade imbalance for all the three event windows. When lagged one day market trading imbalance goes up, contemporaneous institutional trading imbalance goes up, and vice versa.

The rest of paper is organized as following: the second section presents the literature in this area. The third section presents our three hypotheses and the fourth section contains a detailed description of the data and methodology, respectively. The fifth section discusses the empirical results. The tests and regressions are discussed in this section. Lastly, the sixth section summarizes and concludes the study.

2.0 Literature

Institutions have become increasingly important in the market. Their role in the financial market and their trading patterns draw substantial attention in academic research. There is increasing literature which compares the trading patterns of institutional traders and retail investors. Some studies imply that institutions are informed investors and they have better information advantages over other market participants (Irvine, Lipson, and Puckett (2007), Cohen,Frazzini, and Malloy(2007)); while, other literature argues that the institutional superior trading performance stems from their better ability to quickly process publicly available information rather than a private information advantage. (Griffin,Shu, and Topalogu(2007)).

Extensive prior studies suggest that unlike retail traders, institutional investors are sophisticated; usually they benefit from their superior trading skills and strategies. Badrinath, Kal and Noe (1995) find that stocks with larger institutional ownership outperform stocks with small institution ownership. Also, Sias and Starks (1997) indicate that stocks with large institution ownership are more efficiently priced than those with

small institution ownership after controlling for analyst coverage, institutional trading, short selling, liquidity and other firm specific characteristics. Odean (1999) finds that stocks purchased by retail investors consistently underperform compared to the stocks they sell. Furthermore, Baker et al. (2010) find that mutual fund trades can predict earnings surprises and therefore earn profits from it because they are able to forecast earnings related fundamentals.

Both academics and practitioners present tremendous interest in how the two different groups, institutional investors and retail investors, trade around public firm-specific announcement, such as, IPOs, takeover announcement, seasonal equity offerings, earnings announcement, etc. Bernard and Thomas (1990) identified under-reaction to unexpected earnings announcements, also known as PEAD (post earnings announcement Drift), Lee (1992) suggest that individual traders react more slowly to news announcement than institution nal investors. Hong et al. (2000) shows that the negative firm-specific news disseminates slowly among the retail investors. More recently, Tetlock, Saar-Tsechansky and Macskassy(2008) and Engelberg, Reed and Ringgenberg(2010) find that market investors hold different interpretations towards public news release and therefore demonstrates that information content in public news presents profitable trading opportunities for the skilled investors. Ma (2011) finds the trading advantages of institutions compared to the retail investors arise not only from their information advantage but also their better abilities to efficiently process publicly available information. Particularly, institutions anticipate and trade in the direction of

negative sentiment of news events, and institutions trade aggressively on the event day and the abnormal trading behavior quickly disappears post announcement.

Limited research has been focused on institutions' trading activity around financial or monetary news release. Nofsinger (2000) investigates the trading activities of institutional and individual investors around both firm-specific news releases documented in the Wall Street Journal as well as macro-announcements. His research presents that investors trade in large volume, specifically around earnings and dividends announcement. Institutions trade actively towards both positive and negative firm-specific news, whereas individuals tend to trade solely on positive firm-specific news. Furthermore, the study finds that both institutions and individuals buy large firms during the release of positive economic news and sell large firms during the release of negative news. Since macro-economic news, such as financial and monetary policy, are all important components of the public news, our research contributes to investigating the trading pattern of institutions specifically during the release of quantitative easing policy.

While many studies investigate the different types of investors' trading pattern by adopting trade size or institutional ownership as proxies (Nofsinger and Sias(1999), few studies explore the intraday activities of the institutions as well as the rest of the market participants. Notable exceptions are Irvine, Lipson and Puckett (2007) who investigate the trading pattern of institutions immediately before the release of analysts' initial buy recommendations. It is documented from their research that five days before the public release of buying recommendations, there is an abnormally high trading volume and

buying activity. Tetlock et al.(2008) show that there are potential profits if investors use daily trading strategies based on the level of the negative tones of the news stories in a continuous intraday news resources. These two studies both indicate the potential for profitable trading opportunities for skilled investors around the release of public news.

3.0 Hypotheses Development

Some studies argue that institutions are able to privately gather information and anticipate major news events. Larson (2008) finds that institutions can anticipate the public disclosure of accounting fraud. Institutions which are able to forecast the forthcoming news are more likely to obtain trading profits by submitting orders before the actual announcement of the public news, given the fact that the qualitative information embedded in public news is not immediately reflected into stock prices. Jegadeesh and Tang(2010) propose that the institutions' superior information processing skills might be attributed to two possible factors: first, institutions hire professional managers and analysts who are able to better analyze publicly available news; second, institutions can accurately interpret value relevant information in financial statements and corporate reports. Following these prior findings, it is rational to conjecture institutional investors might as well benefit from trading during the US Quantitative Easing policy release, either because of their private information advantages over the uninformed investors, or due to their superior information collecting and processing strategies compared to retail investors.

Our first hypothesis, stated below in alternative form, reflects our primary conjecture that institutional trading might exhibit positive abnormal trading volume and trading imbalances before the public release of the US Quantitative Easing policy.

H1: Ceteris paribus, prior to the actual announcement of the Quantitative Easing Policy, institutions are more likely to be net buyers.

Similarly, Lipson and Puckett (2006) investigate institutional activities (specifically, mutual funds and pension funds) during days the market experiences an absolute return over 2%. Consistently the results indicate that daily aggregate institutional trade imbalance is negatively related to contemporaneous market returns. When market goes up, the institutions are net sellers and vice versa. A possible interpretation provided in their research is that institutions seize the opportunities to enact pre-event trading decisions when market experiences large movements. By trading contrarily against the market, institutions provide stability during such market turmoil instead.

Our second hypothesis, stated below in alternative form, reflects our conjecture that the contemporaneous trading imbalances of institutions during the event window are negatively related to contemporaneous market returns.

H2: Ceteris paribus, Institutions are likely to become net sellers post event.

Chordia, Roll and Subramanian (2002) investigated the autocorrelations of the market order imbalances. Their results indicate an up to five days persistent positive daily lags of the market order imbalances in all three measurements: number of trades imbalances, trade volume imbalances and dollar value trade volume imbalances. Moreover, their research shows that the market contemporaneous market order imbalances indicate an extremely significant impact on market returns. In either case, it is rational to expect there would be either a bi-directional or a uni-directional relationship among the contemporaneous market trade imbalances, contemporaneous institutional trade imbalances and their own lagged terms, respectively. Our research expects that there probably also exists a lead-lag relationship among these variables around public news releases of quantitative easing.

Our third hypothesis, stated below in alternative form, reflects that there should exist at least one direction granger causality relationship among the contemporaneous market trade imbalances, contemporaneous institutional trade imbalances and their own lagged terms respectively.

H3:Ceteris paribus, there should exist a negative relationship between institutional and the rest of the market trading activities.

4.0 Data and Methodology

4.1 Data

Our study focuses on analyzing the high frequency trading activity of institutions during the event window for the US Quantitative Easing policy phases one and two, known as, QE1 and QE2. The sample period covered is from August 2008 to December 2010. The data used in this study comes from several different databases. First, we obtain institutional trading data from Ancerno Ltd. As a large consulting firm, Ancerno manages its clients' equity trading costs. Their clients include both mutual funds and pension plan funds. The Ancerno data captures the detailed transaction history for their clients in the sample, which make the database a perfect choice for investigating institutional investors' intra-day trading skills. For each transaction, Ancerno provides the identity code for the institution, an identity code for the fund within each institution, date of execution, the stock traded, number of shares traded, execution price, commissions involved, and the sign of the transaction (either buy initiated or sell initiated). The database has been widely used in prior academic research (e.g., Chemmanur, He and Hu(2009), Goldstein Irine, and Puckeet(2010) and Puckett and Yan(2011)).

Tables 1 and 2 provide a general overview of the Ancerno database. The Ancerno database covers a broad range of the institutions. During our three-year sample period, for each year there are approximately 280 different institutions covered. There are 333,283,242 institutions included in the sample for 2008, 2009 and 2010 separately. Approximately 4000 stocks were documented each year in the database. Over 10 trillion trades were involved for years 2008 and 2009 and about 8 trillion trades for 2010. At the same time, the trading volume is large; for 2008 and 2009, there are on average 135 billion shares trades; for 2010, the volume is almost 60 billion. Constantly, the total

dollar value trading volume is with dollar trade volume of US $4.06 trillion, US$2.8 trillion and US$1.52 trillion for 2008, 2009 and 2010, respectively. Puckett and Yan (2011) document that the Ancerno clients' trading activities account for about 8% of the dollar value of CRSP trading volume. Therefore, they estimate that Ancerno institutions are responsible for about 10% of all institutional trading volume based on the simple assumption that all institutions account for 80% of all CRSP trading volume. Following Goldstein, Ivirine and Puckett (2010) and Puckett and Yan (2011), we include only trades on common stocks with a share code equal to 10 or 11. Thus, while the Ancerno data captures a fraction of all the institutions, the subset represents a significant part of total institutional trading volume.

One might suspect that by solely investigating institutions documented in Ancerno database, our research might fall into issues of typical sample selection problems: selection bias and issues of survivorship. Institutions included in Ancerno might differ systematically from the typical institution. Puckett and Yan (2010) provide detailed explanations that the Ancerno database is not very different from the 13F universe. First, they conducted a comparison of 64 institutions with institutions' name that Ancerno separately provided with institutions in the 13F universe. Second, they constructed a comparison of quarterly holdings changes between all Ancerno institutions and all 13F institutions. Both results show that not only the stock characteristics but also the return characteristics held and traded by Ancerno institutions are not significantly different from those in the 13F universe. It appears that Ancerno institutions only differ from the typical 13F institution in one aspect: institution size. However many empirical studies (Chen,

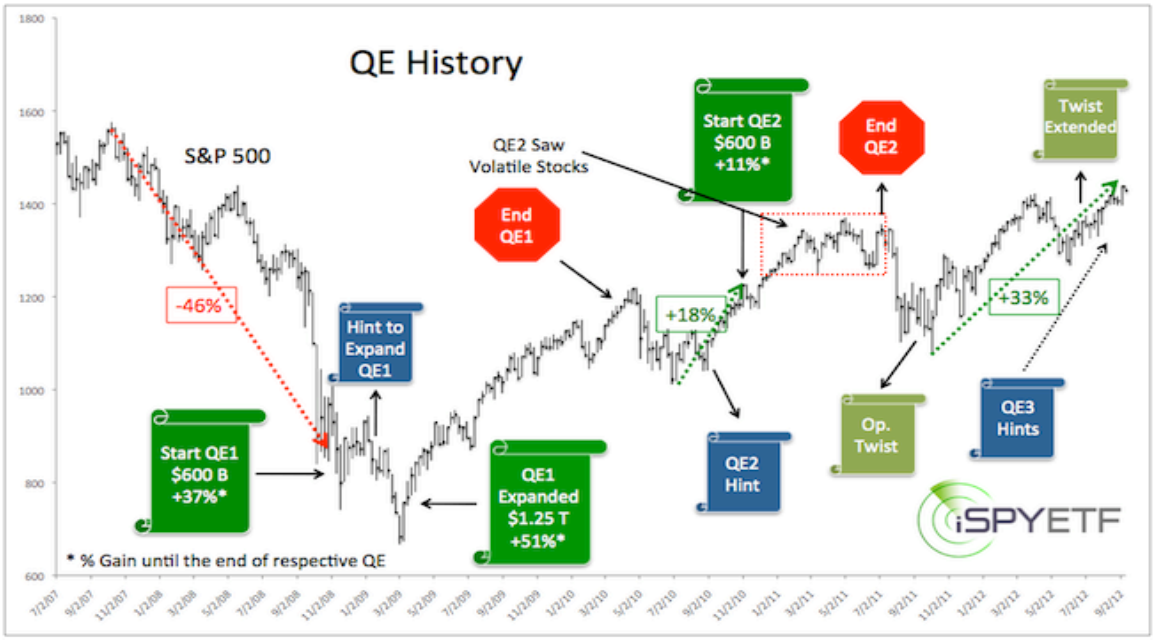
Hong, Huang and Kubik (2004), Yan (2008), KSZ (2008), Lewellen(2009), and EDelen, Evans and Kadlec(2009) actually provide evidence that there lies a negative relation between fund size and performance. Since the Ancerno sample is biased towards larger funds, this type of selection bias will actually statistically goes against with our research.

Another potential selection bias is that institutions might submit non-random data of either ex-post profits or difficult to execute trades to Ancerno. Puckett and Yan (2010) argue that since Ancerno is only a consulting firm which documents institution's execution costs, without providing any investment related analysis or recommendations, institutions should not have any incentive to provide biased or selected data to Ancerno.

We also collect stock and market data from CRSP and TAQ to complement the analysis of Ancerno trade data. We obtain stock returns, share price, trading volume and shares outstanding from CRSP. By merging the intra-day data from the Ancerno database with the CRSP dataset, table 2 presents a brief summary for the combined database. From August 2008 to December 2012, each individual trade is counted and separately organized into two groups, buy-initiated or sell-initiated. The summary statistics demonstrate that the overall trade distribution is highly skewed towards large orders, which is consistent with the findings with Puckett and Yan (2011), suggesting that the institutional trade size are likely to be either very large or very small.

4.2 Methodology

The three events are investigated separately. Although such serial public policy is targeted towards a general goal, the details of the policy change as the economic environment changes. Therefore, we expect the entire market as well as institutions to generate different responses towards QE1 and QE2. The three events are as follows: (i) QE1 announcement on November 25, 2008 (ii) QE2 hints on August 27, 2010, and (iii) QE2 actual announcement on November 3, 2010. Below is a figure of the timeline of the QE policy release[1].



1. Picture source: http://ispyetf.wordpress.com/tag/qe1/

On a given day, trade volume imbalances could conceivably be caused by many factors. Traditional literature has used volume as a proxy for analyzing the trading activity for a long time (Benston and Hagerman (1974); Gallant et al. (1992); Hiemstra and Jones (1994); Lo and Wang (2000)). However, trade volume during a time interval can also be investigated along two aspects: number of trades and size of trades. Analyzing volume alone might fail to convey important market microstructure characteristics (Kyle(1985))

By investigating order imbalances (buy initiated volume-sell initiated volume), intuitively, we could expect to find more private information. Hence, order imbalances should be a better measure to investigate trading activity.

Following Chordia, Roll and Subramanian (2002), for each individual transaction covered in our sample, we obtain the following three measurements: the number of trades, the trade volume and the dollar value trade volume, all of which are then separated by their trade signs into two groups: buy-initiated and sell initiated. In addition, we also obtain trade imbalances for the three measurements. These measurements are as follows:

(1) Daily total institutional number of trades:

(i)Daily institutional total number of trades;

(ii)Daily total number of buy-initiated trades;

(iii)Daily total number of sell-initiated trades;

(iv)Daily number of trade imbalances for institutions, which is calculated as ratio of (no. of buys-no. of sells)/ (no. of buys +no. of sells);

(2) Daily total institutional trading volume:

(i) Daily total shares volume traded by institutions;

(ii) Daily shares volume bought by institution ;

(iii) Daily shares volume sold by institutions;

(iv) Daily trade volume imbalance for institutions, which is calculated as the ratio of , (buy initiated volume - sell initiated volume)/ (buy initiated volume +sell initiated volume);

(3)Daily total institutional dollar value trade volume:

(i) Daily total dollar value volume traded by institutions;

(ii) Daily total buy initiated dollar value volume traded by institutions;

(iii) Daily total sell initiated dollar value volume traded by institutions;

(iv) Daily trade volume imbalance for institutions, which is calculated as the ratio of , (buy initiated dollar value volume - sell initiated daily value volume)/ (buy initiated dollar value volume +sell initiated dollar value volume);

To construct a cross-section and time-series comparison between the institutions and the rest of market around the event day, we first examine the trading activity of institutions and the rest of market twenty days before and twenty days after the event announcement. Following Irvine, Puckett and Lipson (2007), we calculate (1) the daily aggregate buy-initiated trade volume per institution, (2) daily aggregate sell-initiated trade volume per institution, (3) daily aggregate buy-initiated dollar value trade volume per institution, (4) daily aggregate sell-initiated dollar value trade volume per institution, (5) daily aggregate trade imbalance per institution, and (6) daily aggregate dollar value trade imbalances per institution. The above six measures are expressed in percentage by dividing by the total volume traded. Irvine et al. (2007) indicate, "This normalization prevents institutional trading in large firms from biasing the results, as well as reduces cross-sectional variation in trading activity". Next, the above six measures are averaged by institution. Furthermore, we calculate the abnormal institutional trading imbalance during the forty-day event window by comparing with a benchmark level. The benchmark level is

obtained by averaging the variables (1), (2), (3), (4),(5) and (6) during the pre-event window(-61,-21). Then, a general mean difference test is conducted to compare the trading activities for each day during event window (-20, +20) with the pre-event benchmark level, both for institutions and for the rest of market, respectively. Table 3 provides the mean difference and t-statistics of the six measures for institutions. BDV refers to measure (1); Bvolume refers to measure (2); SDV refers to measure (3);Svolume refers to measure (4); TRDI refers to measure (5); DTRDI refers to measure(6). From table 3, on event day=-2, the t-statistic for mean difference of the buy-initiated volume from the benchmark level is -5.24, different at a level of significance of 5%. At the same time, the t-statistic for mean difference of trade volume imbalance from the benchmark is -4.97 at a level of significance of 5%. The results indicate that on event day=-2, the institutions experience abnormal selling volume. On event day=-1, the t-statistic for mean difference of the sell-initiated dollar value trade volume from the benchmark level is 5.50, at a level of significance of 5%. The statistics during pre-event window indicate that there is an increasing selling volume traded by the institutions. On the event day, the t-statistic for the mean difference of the sell-initiated trade volume and dollar value trade volume from the benchmark level is 2.66 and -2.85 at a level of significance of 10%, respectively. Again, institutions sell more than buy on both pre-event windows and on the event day.

Similarly, table 4 provides the mean difference and t-statistics of the six measures for the rest of the market. However, the results do not appear to indicate too much abnormal trading activity for the rest of the market during the event window.

Chordia et al. (2002) provide analysis of market order imbalances autocorrelations and also S&P500 return autocorrelation. Their research reports a persistent up-to-five days positive daily autocorrelation in terms of market order imbalances. However, the S&P500 return has no significant autocorrelation. Following Chordia et al. (2002), we analyzed if there also exist daily autocorrelation for market trade volume imbalances, institutional trade volume imbalances as well as institutional number of trades imbalances in our sample. Unlike the findings in Chordia et al. (2002), our results do not indicate significant daily autocorrelation for market wide trade volume imbalances for lags of up to three days. However, a significant positive auto -correlated relationship is detected for institutional number of trades' imbalances for up-to-three day lags among all three events. Table 5 provides summary statistics for Durbin-Watson test of the three variables: market trade volume imbalance, institutional trade volume imbalance and institutional number of trade's imbalances For lag day one, the three events all report strongly statistically positive autocorrelation with p-value<0.001. The lagged day one autocorrelation parameter is 1.1072, 1.2735 and 1.4844 for event1, event2 and event 3, respectively. For events 1 and 3, the positive autocorrelation is persistent up to three days lag, whereas the significance decreases for lag day 2 and 3 for event2. Similar to autocorrelation of market trade volume imbalances, the autocorrelation for institutional trade volume imbalances is insignificantly positive. (See table 5)

This section provides graphical description of the three measures of trade imbalances introduced in the last section for the three events separately.

Event 1(QE1 announcement) Date: November 25, 2008

Figure 1 describes a comparison of institutional trading volume imbalance versus the rest of market trading volume imbalances during event windows (-40, +40) and window (-7, +7), respectively. Trading volume imbalance is measured as follows:

(Buy initiated volume - sell initiated volume)/ (buy initiated volume +sell initiated volume)

Comparing the trading pattern of institutions with the rest of market is particularly revealing. On the event day, while the whole market responds actively to the release of QE1, which brings positive sentiment to the market, the trade volume imbalance jumps from -0.04 to +0.03, institutions seem to play a role as a liquidity provider in the market. There exists possibilities that institutional investors, like most of the retail investors, did not process better private information advantage, or do not have a superior ability to forecast forthcoming public news event. Furthermore, with regards to such public policy release, institutional traders do not anticipate potential trading profits. Therefore, our first hypothesis is rejected. A positive abnormal institutional trade imbalance is not detected during pre event window. And on post event day, the whole market trade imbalance drops tremendously from +0.03 to -0.06 .The institutions trade contrary to the rest of the market, with trading imbalance increasing from -0.05 to 0.01. Figure 2 illustrates the comparison of institutional dollar value trade volume and the rest of market dollar value trade volume imbalance. Trading pattern displayed is similar to that observed in figure 1. No abnormal positive institutional trade imbalance is present on the pre-event trading days. On the event day, the rest of market dollar value trade imbalance climbs from -0.75

to +0.15. Quickly, on the post event day, the market trade imbalances declines to -0.25. We conjecture that such public news release is quickly absorbed by the market without any post event surprises. With respect to the institutions dollar value trade imbalances, a minor decrease happens on the event day and then bounces back to +0.0175 aggressively due to the large sell activity by the market. The results are consistent with those displayed in figure 1. We could conclude that, first, there does not exist any pre-event positive institutional trade volume imbalance; secondly, when the rest of market floods in buying on the event day and endures large sells on the post-event day, institutions fulfill a role as liquidity providers by trading contrary to the rest of the market.

Event 2 (QE2 hints) Date: August 27, 2010

Figures 3 and 4 describe a comparison of institutional trade (dollar value) volume imbalance versus the rest of market trade （dollar value）volume imbalances within event windows (-40, +40) and (-7, +7), respectively for event 2. Dollar value trading volume imbalance is measured as follows:

(buy initiated dollar value volume - sell initiated dollar value volume)/ (buy initiated dollar value volume +sell initiated dollar value volume).

Figure 3 shows that on the event day,; the entire markets responds aggressively with positive trade imbalance and trade volume imbalance increasing from -0.07 to +0.03. For the institutions, however, the trade imbalance stays negative, decreasing from -0.02 to -0.07. The results are similar to event 1 which indicates that on the event day, institutions actually behave contrary to the rest of market. They play a role as liquidity providers for

the rest of the market. And on the post event day, the market sells to a large extent, whereas the institutions buy in large amount. During the three-day event window, the institutions present a V shape; on the contrary, the market presents a inverse V shape.

As for the dollar value trade volume imbalance, the results deliver similar patterns. The market buys aggressively on the event day and sells quickly on the post event day while the institutions trade contraryto the rest of the market. The whole market's trading imbalance peaks on the event day from negative to positivesignificantly, with dollar value trade imbalance increasing from 0.01 to 0.2. While the rest of market floods in large amounts of purchases on the event day, the institutional dollar value trade imbalance actually decreases from -0.01 to -0.04. The institutional trading patterns during event 2 are exactly the same as those observed around event 1. Moreover, on the post event day, the entire market starts to sell, with dollar value trade imbalance decreasing to -0.15; with respect to institutions, the dollar value trade imbalance goes back to 0.02, whereas for the institutions again, they trade contrary to the rest of market. When the market is selling, they are buying, and vice versa..

Event 3 (QE2 announcement) Date: November 03, 2010

For event 3, which is the actual QE2 announcement, on the event day, neither the entire market nor the institutions behave like the previous two events. On the event day, institutions actually start buying in large amount, with trade volume imbalances increasing from -0.1 to 0.01, whereas for the rest of market trade imbalances remain negative, although increasing from -0. 025 to -0.01. This time around, institutions do not

fulfill a role as a liquidity provider for the rest of market; instead, they begin to buy on the event date. In the post event period, both institutions and the rest of the market start to sell. The institution's trade volume imbalance remains negative while the rest of the markets are close to zero. To conclude, the entire market sentiment does not seem to be positive and aggressive during event 3 windows. Similarly, for the comparison of the dollar value trade volume between the institutions and the rest of the market, during the three-day event window which contains pre-event day, event day, and post-event day, the entire market behaves as a two-day consecutive selling, while on the contrary, the event appears to stimulate the institutions' trading. Institutions' dollar value trade imbalance experiences a huge increase from -0.04 to +015 on event days, and a minor decrease for post event day, but still close to zero.

To summarize, event 1 and event 2 present similar results. Neither institutions nor the rest of market process information advantage; Hypothesis 1 is rejected without observing pre-event institutional net buying. However, we accept Hypothesis 2 that institutions are net sellers post-event. To some extent, the release of event -1 and event -2 increase market sentiment and we observe increasing market buying. Since event 2 presents the hints of QE2, event 3 representing the actual announcement of QE2 did not process too much information content to the market. The results for event-3 did not indicate pre-event institutional net buying or post-event net selling. Both the institutions and the rest of market did not seem to be reacted aggressively to release of the QE3.

Empirical results

In this section, we investigate what determinants are associated with institutional trading imbalances. In the prior section, we introduced market and institutional trading imbalances in three different measurements: (1) daily aggregate number of trades imbalances; (2) daily aggregate trade volume imbalances; and (3) daily aggregate dollar value trade imbalances.

Extensive prior literature analyzes order imbalances around specific events or over short periods of time. Sias (1997) analyzes order imbalances in the context of institutional buying and selling of closed-end funds. Lauterbach and Ben-Zion (1993) and Blume et al. (1989) analyze order imbalances around the October 1987 crash, and Lee (1992) does the same around earnings announcements. Chan and Fong (2000) analyze how order imbalances change the contemporaneous relation between stock volatility and volume using data for about six months. Hasbrouck and Seppi (2001) and Brown et al. (1997) study order imbalances for thirty and twenty stocks, over one and two years, respectively. Chordia, Roll and Subrahmanyam (2001) focus on the aggregate daily order imbalance on NYSE and find that order imbalances are significantly associated with daily changes' liquidity and with contemporaneous market returns, after controlling for volume. Order imbalance increases following market declines and vice versa, which reveals that investors are contrarians on aggregate. At the same time, their research present that market-wide returns are strongly affected by contemporaneous and lagged order imbalances.

Besides market returns, on a given day, market-wide order imbalance could conceivably be caused by many factors. Market returns and changes in macroeconomic variables immediately come to mind. There is also some reason to expect market sentiment, market volatility to be related to the abnormal trade imbalances.

Following Chordia, Roll and Subrahmanyam (2001), this part studies in sequence (1) properties and determinants of market-wide daily order imbalances, and (2) the relation between order imbalance and daily stock market returns, market sentiment, market volatility, etc. We investigate daily aggregate trading imbalance (buyer initiated trades minus seller initiated trades) using three related measures: first, difference in number of shares tradedsecond, difference in value of shares traded and finally, the difference in the number of trades for both market and institutions. An event window of -40 to + 40 trading days around the announcement day is constructed.

Put/call ratio is adopted as an indicator of market sentiment. Prior literature (e.g. Simon and Wiggins (2000) show that put/call ratio has statistically and economically significant forecasting power for market sentiment. Natural logarithm of maximum S&P 500 index over minimum S&P 500 index is presented to capture daily market volatility. Value-weighted S&P 500 index is included to indicate market returns. Chordia, Roll and Subrahmanyam (2002) investigate order imbalances, liquidity and market returns and find that, besides the strong contemporaneous association between stock returns and order imbalances, order imbalances are also strongly related to past market returns. There is evidence of aggregate contrarian behavior. Order imbalances are high following market

declines and low following market advances. Therefore, lagged market returns are added to further investigate institutional contemporaneous trade imbalances. Since we are analyzing trading imbalances around specific news releases (QE1 and QE2), it would be necessary to construct dummy variables to differentiate the pre-event days and post event days. The variable *Evt* is created and is defined as follows: if trade day fall before the event day, we make the dummy variable Evt equals to one; if not, we make the Evt equals to zero.

The variables included in our analysis are as following:

(1) Daily aggregate number of trades imbalances, presented as NTRI in the regression;

(2) Daily aggregate trade volume imbalances, presented as TRI in the regression;

(3) Daily aggregate dollar value trade volume imbalances as DTRI in the regression;

(4) Put/call ratio: an indicator of market sentiment;

(5) Daily volatility measured as logarithm {max (S&P500)/min(S&P500)} ;

(6) Market returns measured as S&P500 value weighted return;

(7) Lagged market returns measured as lagged day one S&P500 value weighted return;

(8) Dummy variables, which indicate the event. If the date is before the event, then the dummy variable *evt* equals to zero; if the date is on or after the event, the dummy variable *evt* equals to 1;

(10) A series of interactive variables are introduced into the regression also. *Pcinter* refers to the interactive variable of put/call ratio and *evt*; *volinter* refers to the interactive variable of daily volatility and *evt*; *vwrinter* refers to the interactive variable of

S&P500 value weighted market return; *laggvwrinter* refers to the interactive variable of lagged value S&P500 value weighted market return and *evt*.

Regressions are estimated to analyze the relationship between the daily aggregate trading imbalance and the market sentiment, the market volatility and macro-economic variables for institutions during the three-day event window. For each separate event, we run the following three regressions. The independent variables are the three different measurements in terms of institutional trade imbalances: (1) NTRI, institutional number of trades imbalances, (2) VOTRI, institutional trade volume imbalances, and(3) DVTRI, institutional dollar value trade volume imbalances.

(1) NTRI= α+β0*put/call ratio+ β1*daily volatility+ + β2* value-weighted S&P500 index+ β3*lagged value-weighted S&P500 index+ β4*eve+ β5*pcinter+ + β6*volinter+ β7*vwinter+ β8*laggedvwinter;

(2) VOTRI= α+β0*put/call ratio+ β1*daily volatility+ + β2* value-weighted S&P500 index+ β3*lagged value-weighted S&P500 index+ β4*eve+ β5*pcinter+ + β6*volinter+ β7*vwinter+ β8*laggedvwinter;

(3) DVTRI= α+β0*put/call ratio+ β1*daily volatility+ + β2* value-weighted S&P500 index+ β3*lagged value-weighted S&P500 index+ β4*eve+ β5*pcinter+ + β6*volinter+ β7*vwinter+ β8*laggedvwinter;

Panels A, B and C present the regression results of institutional daily aggregate number of trade imbalance, daily aggregate trade volume imbalance, and daily aggregate dollar value trade volume imbalance, respectively for event 1 on put/call ratio, value weighted market return, lagged value weighted market return, daily volatility, event dummy variable, and the interactive terms of all the above variables with the event dummy.

From the results of Panel A in table 6, it appears that none of the variables are statistically significant in explaining the daily aggregate number of trades' imbalances. Results in panels B and C are similar except thecoefficient of value-weighted market return and the coefficient of lagged value-weighted market return in panel B which are -0.56 and 0.67 and significant at the level of significance of 1%, respectively. The coefficient of the interactive variable of the event dummy evt and the value-weighted market return is -0.043 at the level of significance of 10%. This result is consistent with the findings with Chordia, RollSubrahmanyam (2002) who explore the relationship between market returns and aggregate daily order imbalance on the New York Stock Exchange and find that order imbalance increases following market declines and vice versa, which reveals that investors are contrarians on aggregate. The other variables, put/call ratio, daily volatility,

and the event dummy, as well as the interactive variables do not appear to indicate explanatory power for institution's trade volume imbalance.

Panels D, E and F present the regression results of institutional daily aggregate number of trade imbalance, daily aggregate trade volume imbalance, and daily aggregate dollar value trade volume imbalance, respectively for event 2 on put/call ratio, value weighted market return, lagged value weighted market return, daily volatility, event dummy variable, and the interactive terms of all the above variables with the event dummy.

From the results of panel D in table 7, the statistics show that only the interactive variable of event dummy evt and value-weighted market return, vwrinter, is significant in explaining the institutional number of trades' imbalances, with coefficient equals to -3.11，1.96 and t-statistics equals to -2.03，2.1，respectively. Moreover, results in panel E present that the contemporaneous market returns and the lagged market returns are negatively related to institutional trade volume imbalances. The coefficient of contemporaneous trade volume imbalance is -2.02 with t-statistics of -2.03. And, the coefficient of lagged trade volume imbalance is 1.97 with t-statistics of 2.11. Again, the results are consistent with the findings of Chordia, Roll and Subrahmanyam (2002) who find that besides the strong contemporaneous association between stock returns and order imbalances, order imbalances are strongly related to past market returns. In panel F, put/call ratio, contemporaneous value-weighted market returns, lagged value-weighted market returns, and the interactive variable of event dummy and daily volatility all present statistically significant explanatory power. The coefficient of put/call ratio is 0.16

with t-statistic of 1.69; the coefficient of contemporaneous market return is -1.80 with t-statistic of -1.85; the coefficient of lagged market return is 1.98 with t-statistic of 2.19; and the coefficient of volinter is 17.09 with t-statistic of 1.76. The results are consistent with the Chordia, Roll and Subrahmanyam (2002) who provide evidence of aggregate contrarian behavior. Signed order imbalances are high following market declines and low following market advances, and order imbalance increases following market declines and vice versa, which reveals that investors are contrarians on aggregate.

For event 3, from the results in panel G in table 8, the results show that put/call ratio coefficient is -0.23 with t-statistics of -2.80, and the daily volatility coefficient is -6.17 with t-statistics of -1.74. Both variables are significantly negatively related to the institutional number of trades' imbalances. At the same time, lagged market return and the event dummy are also negatively related to the institutional number of trades' imbalances. Under the condition that market sentiment is bearish, the market returns are negative, and the market is more volatile, the institutions actually experience more number of buy-initiated trades than sell-initiated trades. When it comes to panel H, which investigates the institutional trade volume imbalances, only contemporaneous market return is significantly negatively related to the institutional trade volume imbalances. The coefficient of the contemporaneous market return is -2.31 with t-statistics of -1.27. These results are consistent with the prior two events. In terms of panel I, which investigates institutional dollar value trade volume imbalances, the variables do not appear to have too much explanatory power.

Furthermore, we attempt to aggregate the three events together to test the institutional and the rest of market trade volume buy-sided as well sell-sided trade volume. From table 9, the two variables event dummy evt and market sentiment proxy put/call ratio consistently demonstrate significant explanatory power. For institutions, institutions increase its selling post event (-0.91 with t-statistics 3.55) and decrease buying pre event (-0.49 with t-statistics -2.27). Along with the release of the QE serial news, the market index experiences an upward increase. Therefore, we could conclude that the institutions sell at a higher price. In terms of the market sentiment, when market sentiment increases, institutions increase buying,(-0.07 with t-statistics -0.43); when market sentiment decreases, institutions increase selling(-0.31 with t-statistics 6.01). With respect to the rest of the market, although the two variables are statistically significant, the sign of the variable coefficient is the same for both the sell-sided and buy-sided trade volume. A plausible explanation is that Ancerno dataset approximately represent 10% of the entire CRSP institutions (Goldstein,Ivirine, Puckett(2011)), the rest of the market still includes the rest of 90% of the CRSP institutions. The rest of the market is contaminated with combining both the retailed investors and the other 90% of institutions. When we If the other 90% institutions trade similarly with the Ancerno documented institutions, we could introduce Ancerno institutions trade volume(a proxy for the entire CRSP institutions) into the regressions for the institutions trade volume , the sign of the event duumy evt flips.(see table 09)

Chordia et al. (2000) report that “contemporaneous order imbalances exert an extremely significant impact on market returns in expected direction; and the positive coefficients

imply that excess buy(sell) orders drives up(down) stock returns. Interestingly, lagged order imbalance exerts a significant negative effect on the current day's return after controlling for the contemporaneous order imbalance." Therefore, the buying and selling activity of the entire market could explain a significant portion of daily market return. Chordia et al. (2000) also indicate an interpretation that the microstructure effects are not solely restricted to the level of individual stocks, but also influenced by the trading activity of the aggregate market. Following Chordia et al. (2000), our research continues investigating the explanatory power of contemporaneous and lagged market trade imbalances on contemporaneous market return. Table 9 provides the summary statistics for the three individual events during the event window (-40, +40). In general, the results are consistent through all three events. Contemporaneous market trade imbalance is significantly positive related to contemporaneous market return. The parameter is 0.90, 0.29 and 0.18 for the three events, with t-statistics of 9.17, 8.99 and 6.48, respectively. Furthermore, lagged day one market trade imbalance is significantly negative in explaining the contemporaneous market return. The parameter is -0.33, -0.04 and -0.05 for the three events, with t-statistics of -3.59,-1.30 and -2.04, respectively. The other variables, put/call ratio, VIX, and Daily volatility do not exhibit significant explanatory power. (See table 11).

Finally, Linear Granger Causality tests are used to examine the dynamic relation between the contemporaneous market trade imbalances, institutional trade imbalances and the lagged market trade imbalances as well as institutional trade imbalances. Numerous studies have examined the dynamic linear and nonlinear Granger causality relations

between stock market trading volume, returns and volatility (E.g. Hiemstra et Jones (1995), Lee & Rue (2002)). Lee & Rui (2002) find evidence of significant bidirectional nonlinear causality between returns and volume.

Granger causality test is applied to the contemporaneous institutional trade volume imbalances， contemporaneous market trade volume imbalances on the three lagged terms of the institutional and market's trade volume imbalances for the three events separately. Similarly, we do the same regression for the contemporaneous institutional and market dollar value trade volume imbalances. The three events present similar results. For the three events, the institutional trade volume imbalances and dollar volume imbalances are significantly positively related to the lagged day one market's trade imbalances. From table 11 the coefficient of the lagged day one market's trade imbalance is 1.25 with t-statistics of 5.53, and the coefficient of the lagged day one market' dollar value trade imbalance is 1.10 with the t-statistic of 2.63. From table 12, the coefficient of the lagged day one market's trade imbalance is 0.88 with t-statistics of 2.77, and the coefficient of the lagged day one market' dollar value trade imbalance is 0.87 with the t-statistic of 2.20. From table 13, the coefficient of the lagged day one market's trade imbalance is 0.38 with t-statistics of 1.11, and the coefficient of the lagged day one market' dollar value trade imbalance is 0.51 with the t-statistic of 1.63 (see tables 11, 12 and 13).

Our results suggest that institutional traders do not seem to lead the market in response to the news event of quantitative easing. However, we do find indications of greater

liquidity demand from the rest of the market post announcement. This is in the form of increased trading imbalance due to larger buyer initiated trades. During this phase, institutions seem to be fulfilling the role of liquidity providers by selling more shares. We find that, at least in the short run, there is uni-directional Granger causality running from market trading activities to institutional trading behavior. The relationship is negative.

Conclusion:

In this paper，our objective was to examine the trading activity of institutions around specific public news release, US Quantitative Easing policy, also known as QE1 and QE2. Based on the prior literature, we investigate if the institutions have either information advantage towards such public news or possess better skills to take advantage, by comparing the trading activities of institutions and the retail investors by looking at trade imbalances. By using the intra-day date from Ancerno database, we obtain three different measures of trade imbalances: number of trades imbalances, trade volume imbalances, and dollar value trade volume imbalances during event window (-40, +40) around event day, separately for the three events. In general, our results demonstrate that the institutions did not seem to react actively towards the release of such public news. More likely, they fulfill a role as liquidity providers to the rest of the market. Then, we construct a mean difference test of trading behavior between a pre-event benchmark level and each trading day during event window (-20, +20) for institutions and the rest of market, respectively. It appears that the releases of Quantitative Easing Policy stimulated and boosted the market positively; the market reacted rapidly on the announcement day, and then quickly calmed down. Furthermore, following Chordia et al. (2002), we analyze

what causes the institutional market trade imbalances during the event window (-40, +40). Our results demonstrate a consistent result with Chordia et al. (2002) that there exists a significant negative relationship between institutional trading imbalances and the market returns. Order imbalance increases following market declines and vice versa. Moreover, our study demonstrate that contemporaneous order imbalances exerts an extremely significant impact on market returns in the expected direction, and the positive coefficients imply that excess buy (sell) orders drives up (down) prices, and the lagged order imbalance exerts a significant negative effect on the current day's return after controlling for the contemporaneous order imbalance. These results again are consistent with the findings in Chordia et al. (2002). Finally, Granger causality test is constructed to check statistically the relationship among the contemporaneous market, institutional trading imbalances, as well as their lagged terms, respectively. The results illustrate a one-direction relationship. There is a significant negative relationship between the institutions trading imbalances and the market trading imbalances. When market-trading imbalance goes down, institutional trading imbalance actually goes up, and vice versa. Along with the release of QE serial policies, the market index S&P500 experience an upward trend during the event window, while the institutions increase selling post event and decrease buying pre event, it could be concluded that the institutions sell at higher prices. The rest of the market pushes up the market index; whereas wealth is transferred from the rest of market to the institutions. The release of the QE policies benefit the small amount of institutions instead of the retailed investors.

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Appendix

Table 1:Summary statistics for Ancerno from 2008 to 2012

Institutional trading data are obtained from ANcerno.Ltd. The sample includes only common stocks (those with a sharecode of 10 or 11 in CRSP). This table demonstrates descriptive statistics for the ANcerno institutional trading data for each year of the sample period.

Year	2008	2009	2010
No. of institutions	333	283	242
-Mutual Funds	150	124	98
-Plan Funds	183	159	144
Total No. of stocks	4258	4113	3740
Total No. of trades(trillion)	13.03	11.9	7.52
Total share volume(billion)	142.19	130.01	58.26
Total Dollar volume($trillion)	4.06	2.8	1.52

Table 2: Summary statistics for all trades in Ancerno from 2008 to 2012

Year	2008-2012	
Mean share volume per trade	Buy side	Sell side
	5278.84	5402.34
Median share volume per trade	Buy side	Sell side
	300.00	216.00
Mean dollar volume per trade	Buy side	Sell side
	128669.4	-127519
Median dollar volume per trade	Buy side	Sell side
	7831.4	-5516

Table 3 presents measures of institutions' trading activity winthin (-20, +20) window around the three events. Bdv refers to institutional buy-initiated dollar value trade volume; sdv refers to institutional sell-initiated dollar value trade volume; bvolume refers to institutional buy-initiated trade volume; svolume refers to institutional sell-initiated trade volume; TRDI refers to institutional trading volume imbalance, which calculates as percentage: (buy-initiated trade volume-sell-initiated trade volume)/total trade volume. DTRDI refers to institutional dollar value trade imbalance.

Table 3:Daily averaged Institutional imbalance for institutions

Event day	bdv	bvolume	sdv	svolume	TRDI	DTRDI
-20	-1.48	-0.20	2.53*	-2.03	0.62	0.94
-19	-6.01***	-2.81*	5.07**	-0.63	-6.07***	0.29
-18	-5.32**	-10.33***	2.87*	-0.78	-1.05	1.19
-17	-1.50	0.23	16.68**	-1.86	0.93	5.20**
-16	-5.43**	-13.72***	7.19***	-6.89	-0.46	5.01**
-15	-0.61	0.59	4.10**	-1.63	0.89	4.26**
-14	-5.32**	-1.27	2.18	-0.60	-0.53	0.48
-13	-3.85*	-4.08**	3.23*	-8.10*	-1.33	1.38
-12	-0.52	-0.13	3.96**	-3.33*	0.14	0.83
-11	-4.37**	-3.94**	0.78	-0.93	-0.64	-0.30
-10	1.63	1.44	-0.68	0.83	3.69*	1.26
-9	1.06	1.03	-0.44	0.44	1.00	1.42
-8	-5.77***	-3.77**	3.37*	-1.64	-1.13	0.23
-7	-1.39	-0.92	2.37	-0.84	-0.94	0.10
-6	-1.42	-1.25	3.53*	-15.34***	1.06	0.96
-5	0.88	0.63	5.97**	-4.15**	1.19	1.39
-4	0.90	1.02	1.14	-0.86	1.66	1.09
-3	-2.42*	-0.49	1.48	-4.44**	0.61	0.02
-2	-2.45*	-5.24**	2.03	-1.99	-4.97**	0.29
-1	-1.92	-1.28	5.50**	-2.09	0.80	1.74
0	-0.32	-1.10	2.66*	-2.85*	-0.14	0.72
01	-2.59*	0.03	0.82	-0.26	0.19	0.42
02	-2.58*	-3.57*	3.35*	-2.66*	-1.53	1.49
03	-3.22*	-1.64	6.40**	-6.27**	5.37**	7.85*
04	-2.56*	-5.08**	1.03	-1.86	-2.85*	-0.20
05	-3.00*	-5.80**	2.76*	-3.50*	-2.34	1.31
06	-2.65*	-15.52***	2.71*	-1.10	-1.73	1.12
07	-6.69**	-26.58***	1.86	-0.32	-2.43*	-1.02
08	0.48	0.34	4.13**	-21.54***	0.92	1.26
09	0.27	0.31	4.19**	-4.69**	0.64	0.90
10	-4.16**	-19.07***	5.73**	-1.83	-2.14	0.12
11	-5.43**	-4.06**	15.02***	-9.75***	-0.79	-0.32
12	0.62	0.68	4.54**	-2.44	0.96	1.25
13	-1.24	-3.76*	1.11	-0.85	-1.16	-0.47
14	-163.35***	-8.55***	1.73	-1.40	-1.11	-0.86
15	-7.34***	-3.55*	62.24***	-5.60**	0.23	2.34
16	-4.05**	-2.88*	9.13***	-3.02*	0.42	2.74*
17	-3.10*	-2.85*	4.00**	-5.26**	1.03	2.91*
18	-1.48	-7.58***	2.26	-4.78**	0.05	10.32***
19	-1.81	-4.11**	2.57*	-2.02	0.04	0.94
20	-1.70	-0.93	0.66	-0.10	-0.34	-0.15

***indicates significance at 0.01 level; **indicates significance at 0.05 level;

*indicates significance at 0. 1 level;

Table 4 :Daily averaged trading imbalance for the total market

Event day	bdv	bvolume	sdv	svolume	TRDI	DTRDI
-20	0.08	0.17	0.12	-0.11	-0.10	0.17
-19	-0.52	0.23	0.13	0.04	0.04	0.01
-18	-1.24	-0.45	0.27	0.11	0.10	-0.00
-17	-2.25	-0.87	0.37	0.43	0.41	-0.36
-16	-4.13**	-12.08***	0.89	0.23	0.20	-0.21
-15	-0.80	-0.61	0.31	-0.06	-0.06	0.12
-14	-1.36	-1.13	0.43	0.16	0.15	-0.13
-13	0.36	0.79	0.34	-0.36	-0.35	0.37
-12	-6.74**	-5.95**	0.69	0.02	0.01	-0.02
-11	-0.14	-0.99	0.62	-0.45	-0.46	0.38
-10	-1.53	-1.66	0.71	0.14	0.12	-0.12
-9	-0.52	-0.69	0.22	-0.05	-0.06	0.03
-8	0.11	0.06	-0.19	0.39	0.38	-0.30
-7	-3.55*	-1.53	0.41	0.25	0.22	-0.27
-6	-2.76*	-2.67*	0.34	0.04	0.03	-0.09
-5	-0.19	-0.49	0.12	-0.03	-0.04	0.10
-4	-1.74	-0.85	0.33	0.08	0.06	-0.18
-3	-0.39	0.34	0.01	0.04	0.05	-0.15
-2	0.07	0.40	-0.03	-0.03	-0.02	0.00
-1	-0.92	0.09	0.18	0.09	0.09	-0.08
0	-1.52	0.15	0.40	0.09	-0.03	0.08
01	-0.21	-0.10	0.35	-0.10	-0.10	0.18
02	-0.79	-0.57	3.16*	-0.26	-0.28	0.36
03	-3.74*	-1.64	0.61	0.09	0.08	-0.03
04	-1.11	-0.49	-0.11	0.52	-0.11	-0.12
05	-0.86	-0.31	0.35	0.07	0.07	0.04
06	-2.84*	-1.39	0.48	0.15	0.12	-0.13
07	-0.76	-0.31	0.36	-0.13	-0.14	0.15
08	-0.92	-0.56	0.17	0.15	0.14	-0.21
09	-0.24	-0.59	0.25	-0.12	-0.13	0.11
10	-2.21	-1.42	0.29	0.20	0.18	-0.16
11	-0.74	-1.08	0.33	-0.06	-0.06	0.12
12	-2.13	-1.36	0.35	0.17	0.15	0.02
13	-2.92*	-7.53***	0.96	0.22	0.19	-0.16
14	-0.97	-0.40	0.19	0.11	0.11	-0.05
15	-3.89	-1.45	0.41	0.30	0.27	-0.15
16	-1.02	-0.96	0.31	0.44	0.42	-0.37
17	-45.25***	-1.10	0.28	-0.14	-0.16	0.06
18	-0.91	-5.70**	0.72	-0.27	-0.28	0.23
19	-0.74	-2.18	1.16	-0.19	-0.21	0.34
20	-1.27	-1.39	5.60**	0.05	0.01	0.06

***indicates significance at 0.01 level; **indicates significance at 0.05 level; *indicates significance at 0. 1 level;

Table 5 Autocorrelation test for institutional and market trade volume imbalance

Durbin-Watson test is conducted for the three measurements: institutional number of trade imbalances, institutional trade volume imbalances, and market trade volume imbalances during event window (-40，+40). Again, all the trade volume imbalances are presented into percentage. The statistics in parentheses is the p-value related. Order 1,2,3 refers to daily lag1, lag2,lag3.

Durbin-Watson statistics		***Institutional number of trade imbalance***	***Institutional trade volume imbalances***	***Market trade volume imbalances***
	Order	**Pr < DW**	**Pr < DW**	**Pr < DW**
	1	1.1072(<.0001)	1.6314(0.0466)	1.6498(0.0555)
Event1	***2***	1.4135(0.0048)	1.8582(0.2989)	1.8754(0.3266)
	3	1.3201(0.0017)	1.5220(0.9751)	1.6149(0.0634)
	1	1.2735(0.0003)	2.3745(0.9560)	2.0287(0.5515)
Event2	***2***	1.7574(0.1622)	1.9544(0.4633)	1.8782(0.3312)
	3	1.8470(0.3212)	2.2499(0.9132)	2.0849(0.7295)
	1	1.4558(0.0064)	1.8876(0.3068)	1.7831(0.1645)
Event3	***2***	1.1330(<.0001)	1.8267(0.2532)	1.8912(0.3542)
	3	1.4844(0.0169)	1.9296(0.4654)	1.9950(0.5819)

Note: Pr<DW is the p-value for testing positive autocorrelation, and Pr>DW is the p-value for testing negative autocorrelation. Here, we only report summary statistics for Pr<DW.

Figure 1: (QE1 announcement day) Institution trade volume imbalance

Figure 1 contains graphs of institutional trading imbalance around QE1. The graph presents the mean of institutional trade volume imbalance within event window (-40, +40) and (-7, +7), respectively. Trading volume imbalance is measured as percentage: (buy initiated trade volume - sell initiated trade volume)/ (buy initiated trade volume +sell initiated trade volume)

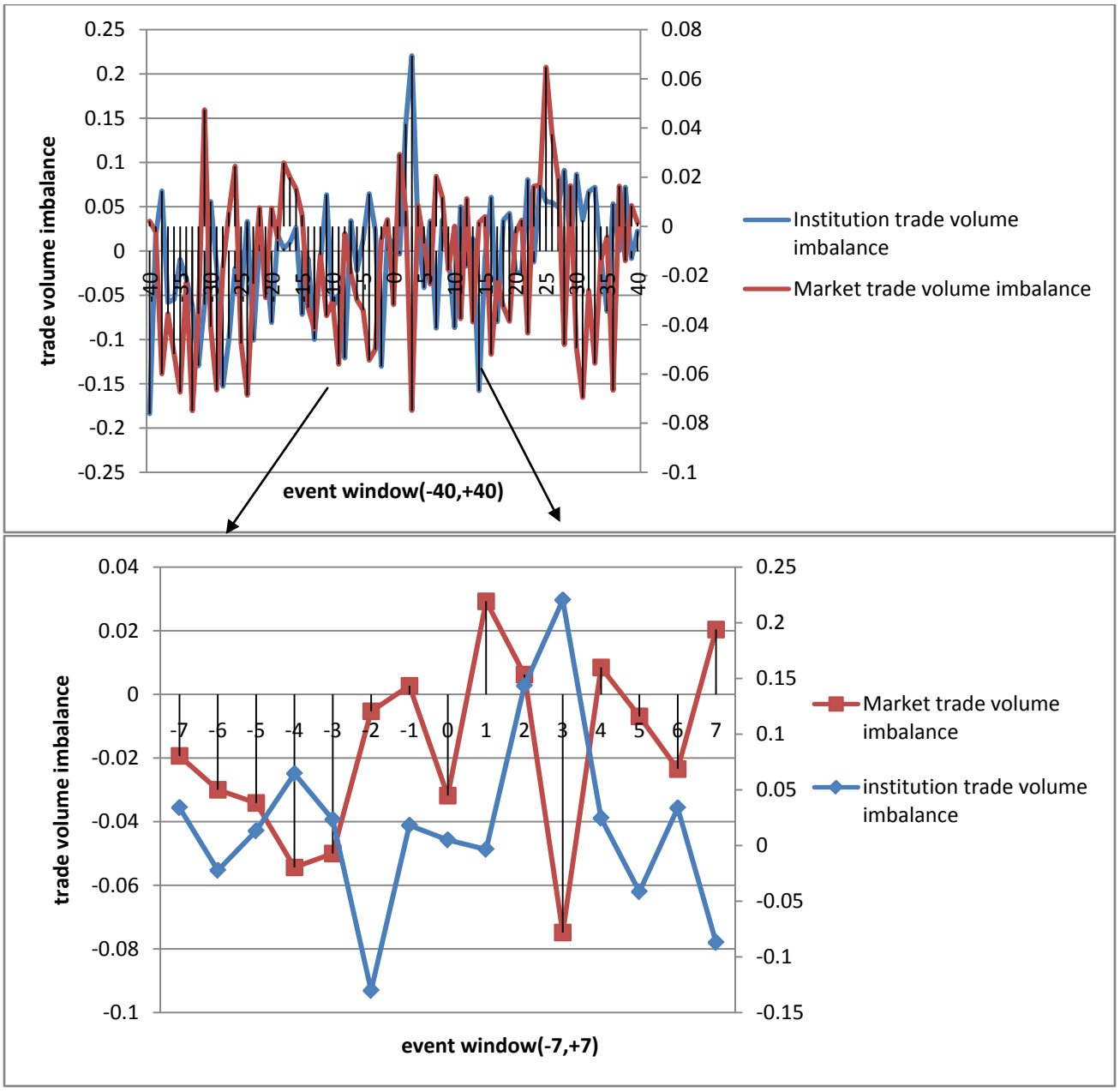
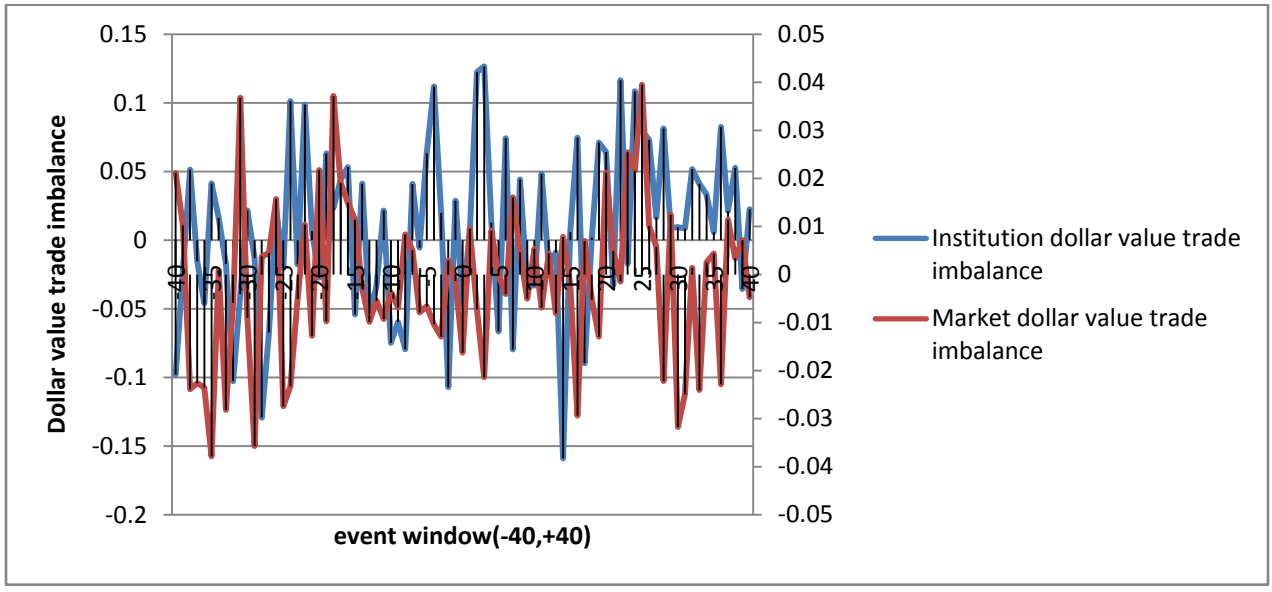


Figure 2: (QE1 announcement day) Institution dollar value trade volume imbalance

Figure 2: the figure describes a comparison of institutional dollar value trading volume imbalance VS. Total market dollar value trading volume imbalances during event window (-40, +40) and event window (-7, +7), respectively. Dollar value trading volume imbalance is measured as percentage: (buy initiated dollar value volume - sell initiated dollar value volume)/ (buy initiated dollar value volume +sell initiated dollar value volume)



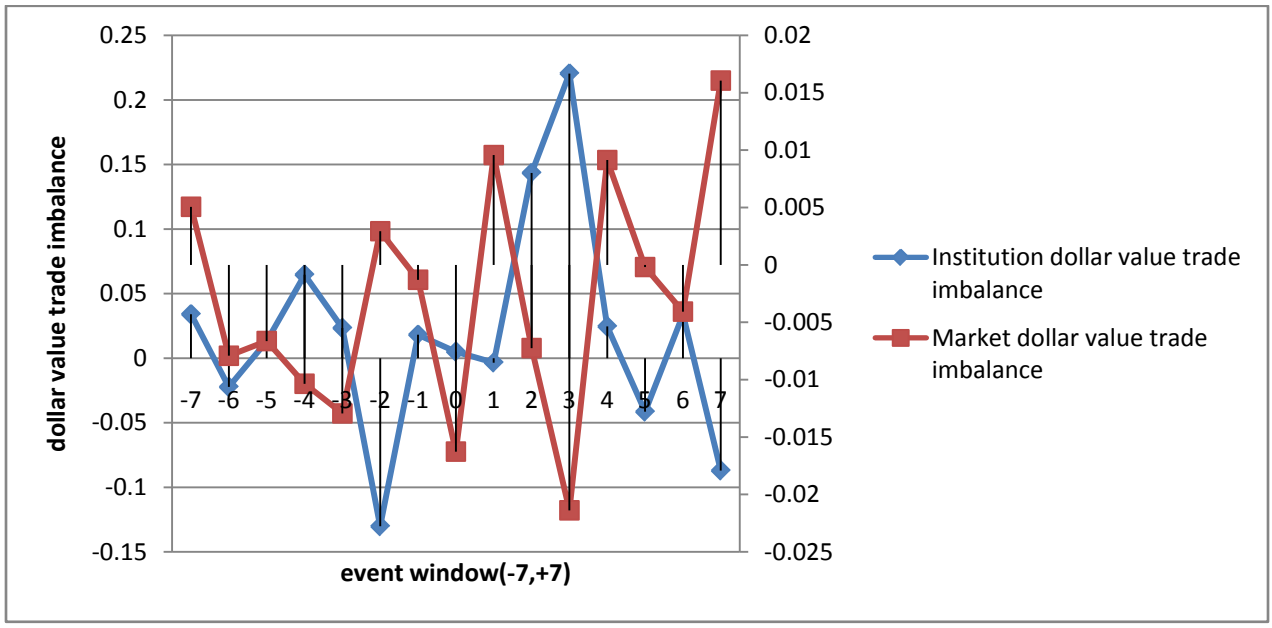
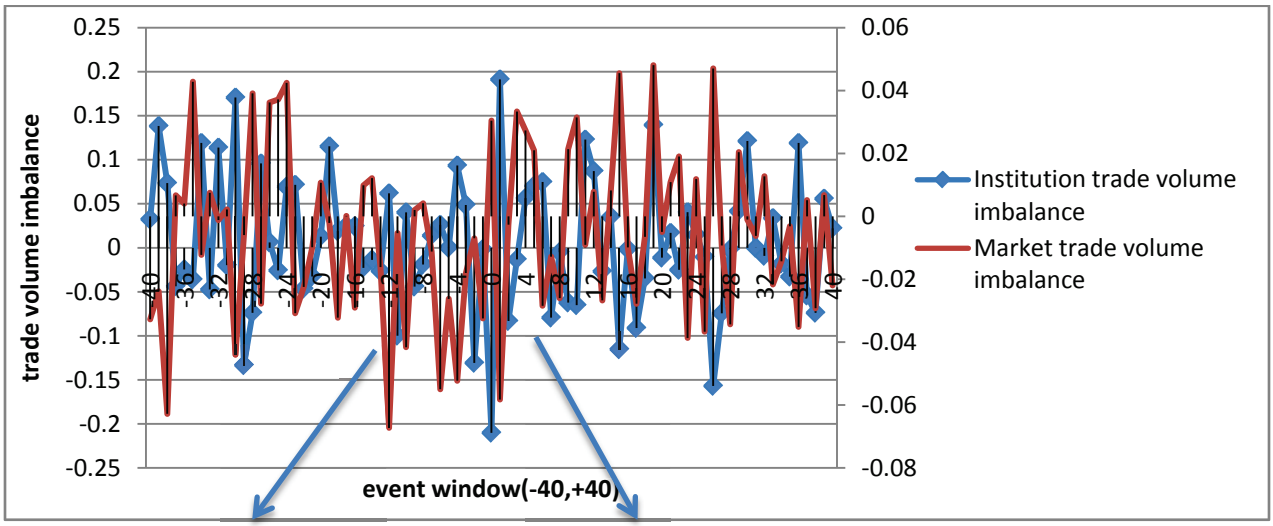


Figure 3: (QE2 hints day) Institution trade volume imbalance

Figure 3: the figure describes a comparison of institutional trading volume imbalance VS. Total market trading volume imbalances during event window (-40, +40) and event window (-7, +7), respectively. Trading volume imbalance is measured as percentage: (buy initiated volume - sell initiated volume)/ (buy initiated volume +sell initiated volume)



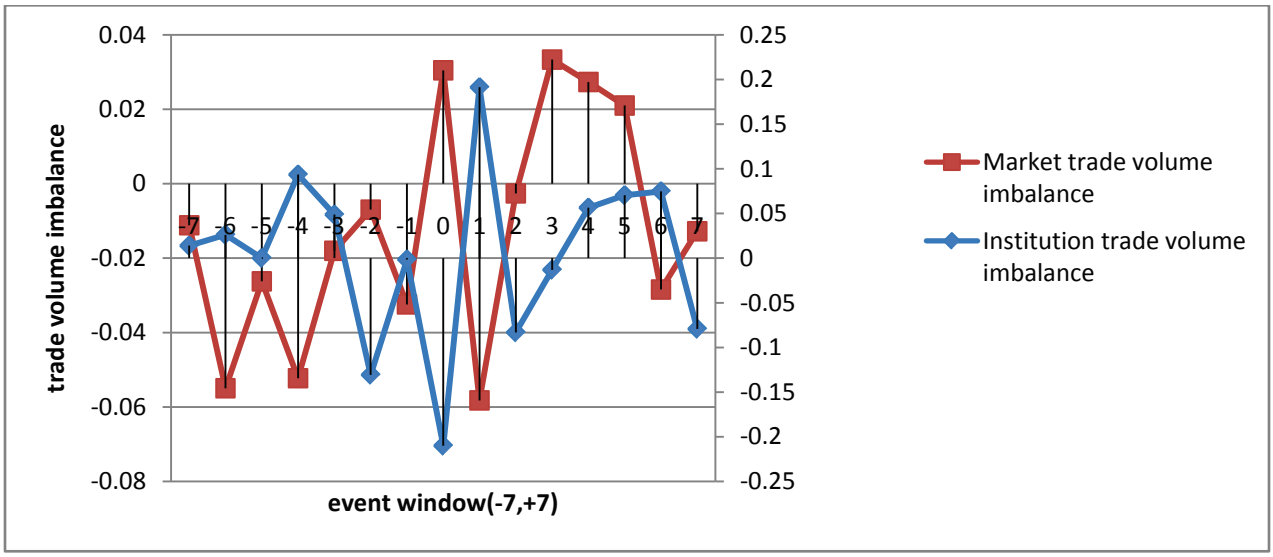
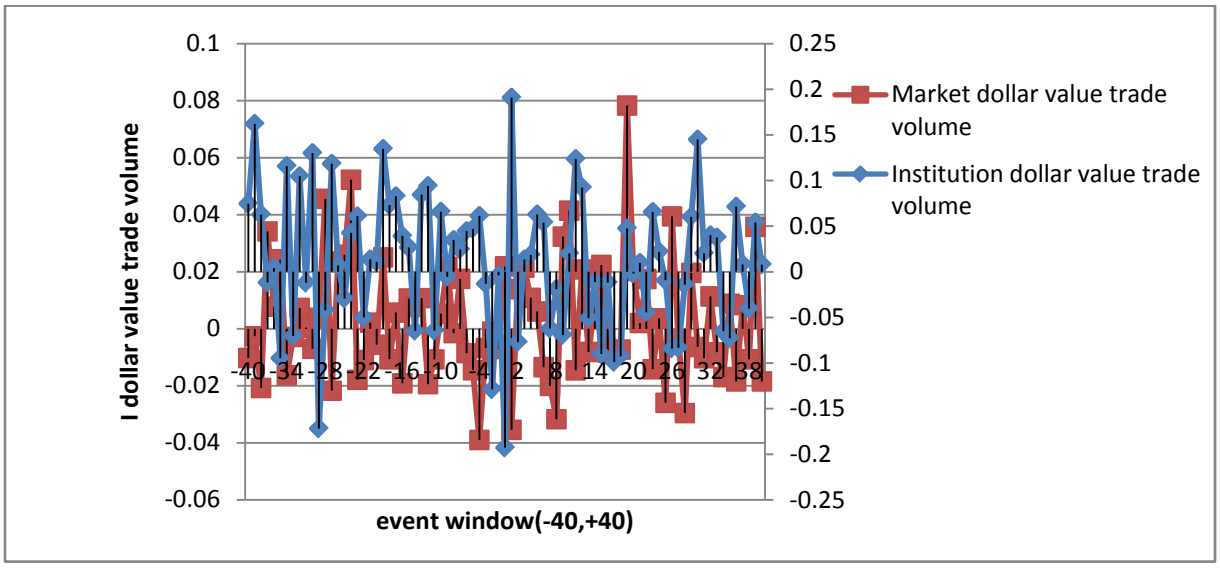


Figure 4: (QE2 hints day) Institution dollar value trade volume imbalance
Figure 4: the figure describes a comparison of institutional dollar value trading volume imbalance VS. Total market dollar value trading volume imbalances during event window (-40, +40) and event window (-7, +7), respectively. Trading volume imbalance is measured as percentage: (buy initiated dollar value volume - sell initiated dollar value volume)/ (buy initiated dollar value volume +sell initiated dollar value volume)



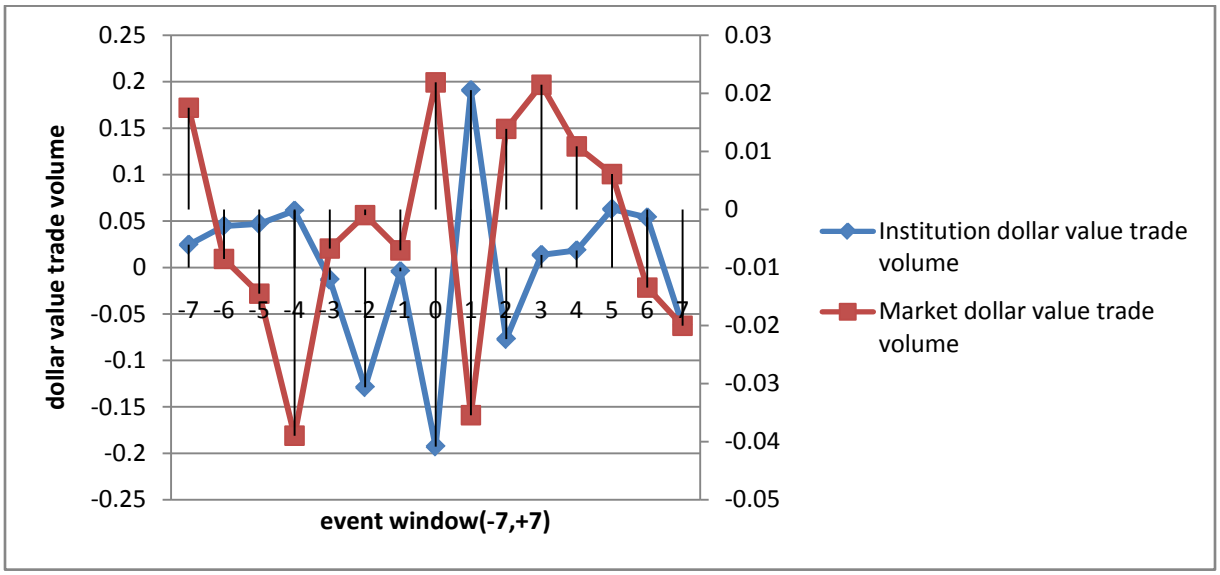
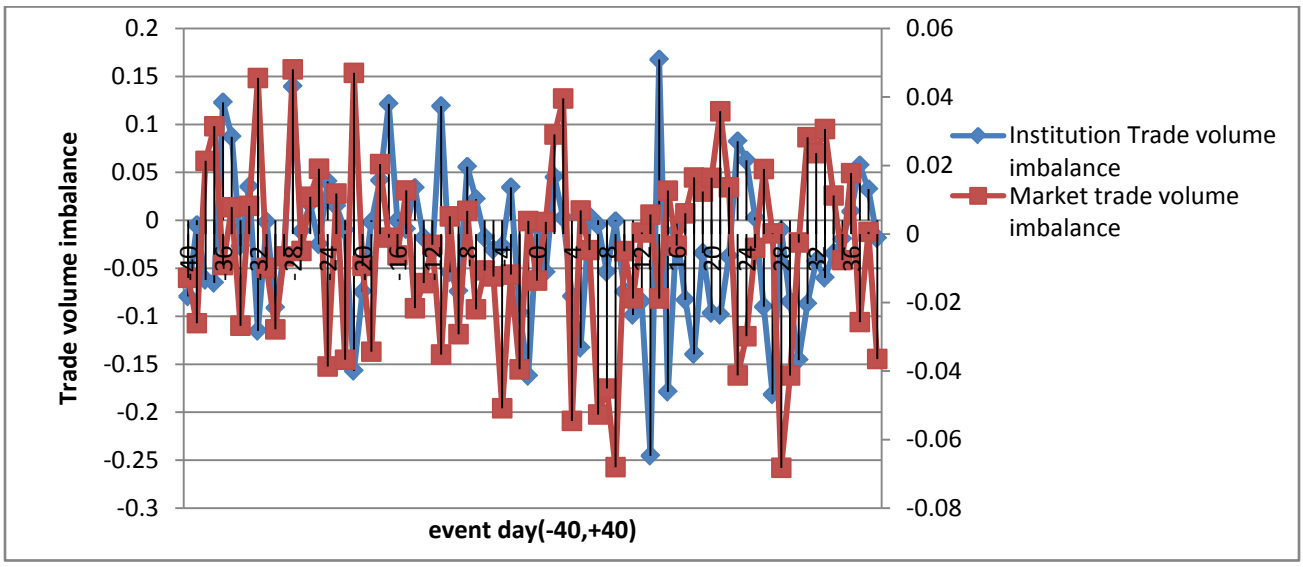


Figure 5: (QE2 announcement day)Institution trade volume imbalance

Figure 5: the figure describes a comparison of institutional trading volume imbalance VS. Total market trading volume imbalances during event window (-40, +40) and event window (-7, +7), respectively. Trading volume imbalance is measured as percentage: (buy initiated volume - sell initiated volume)/ (buy initiated volume +sell initiated volume)



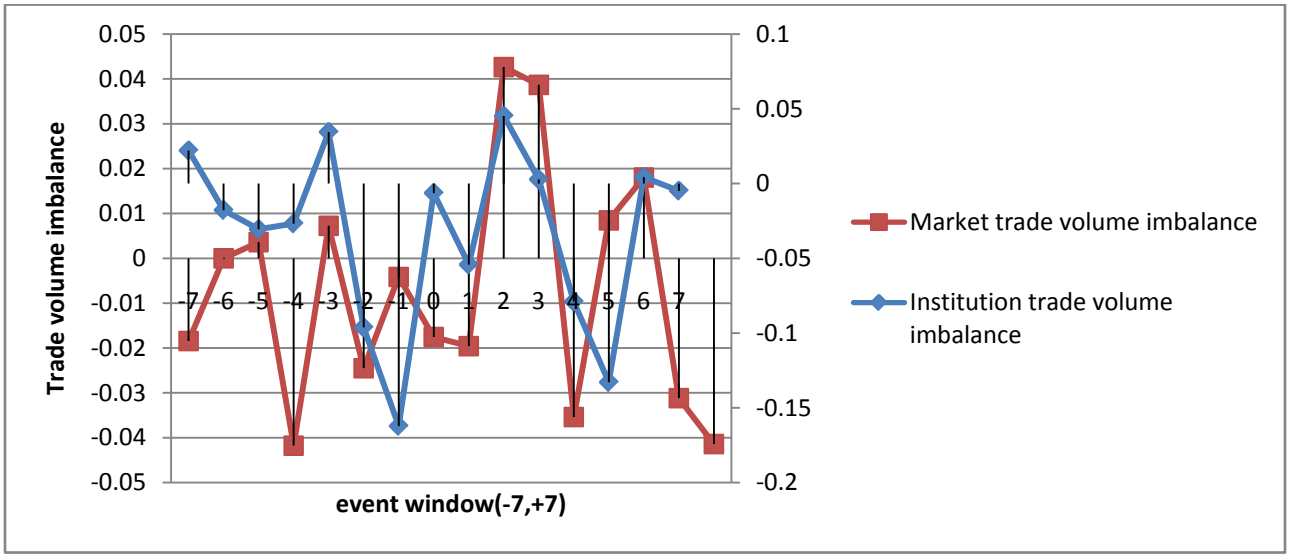
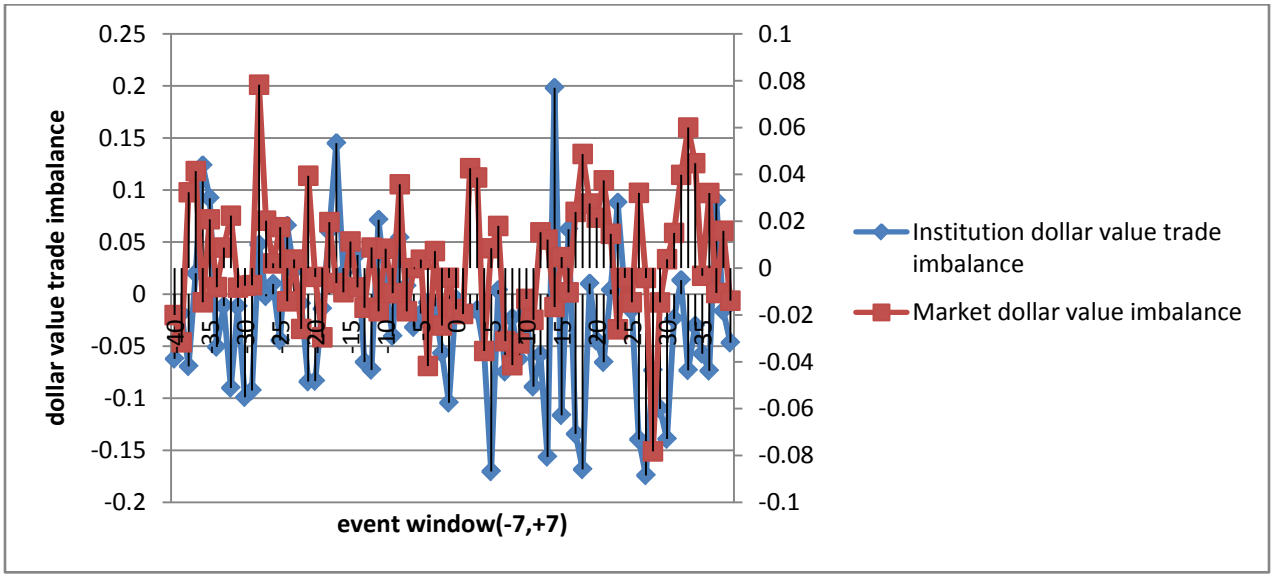


Figure6: (QE2 announcement day) Institution dollar value trade volume imbalance

Figure 6: the figure describes a comparison of institutional dollar value trading volume imbalance VS. Total market dollar value trading volume imbalances during event window (-40, +40) and event window (-7, +7), respectively. Trading volume imbalance is measured as percentage: (buy initiated dollar value volume - sell initiated dollar value volume)/ (buy initiated dollar value volume +sell initiated dollar value volume)



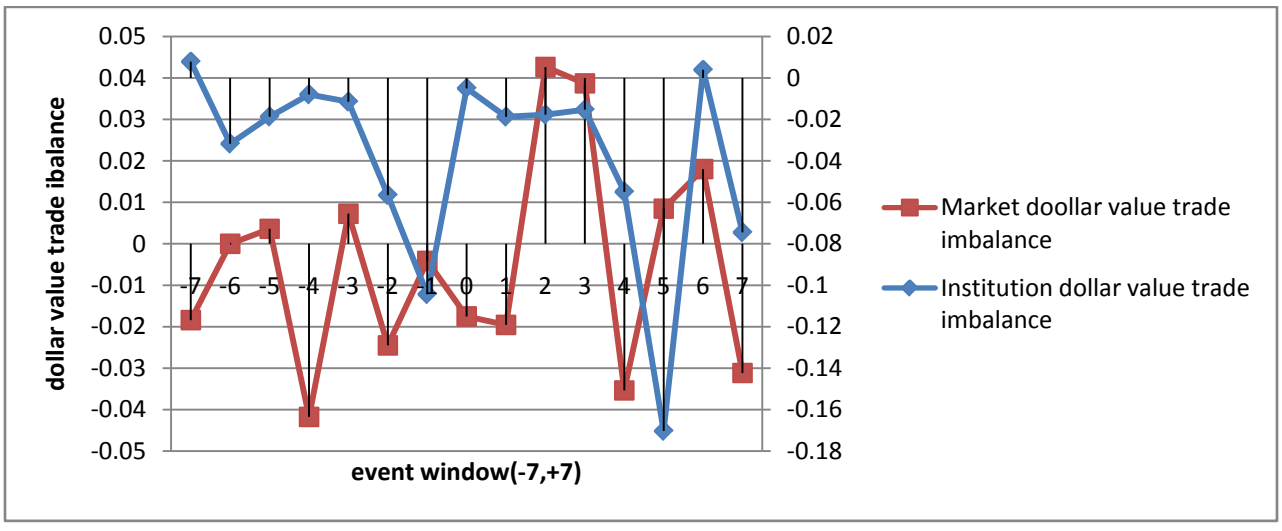


Table6: Event 1 regressions of trade volume imbalances

Panel A, B, C presents the regression results of daily aggregate number of trade imbalance, daily aggregate trade volume imbalance, and daily aggregate dollar value trade volume imbalance, respectively for event 1 on put/call ratio, risk free rate, value weighted market return, lagged value weighted market return, daily volatility, event dummy variable, the interactive terms of all the above variables with the event dummy. pcratio refers to put/call ratio, vwretx refers to the S&P500 value weighted return, daily_volatility is calculated by log(max s&p500/min), evt is the dummy variable for separating pre event and post event, and pcinter, vwinter, lagvwinter, vol inter is the related interactive terms for each vars. Numbers in parentheses are the t-value for the parameters.

	Panel A Regression1	***Panel B Regression 2***	***Panel C Regression 3***
Independent variables	***Number of trades imbalance***	***Trade volume imbalance***	***Dollar value trade volume imbalance***
Adjusted R^2	0.2462	0.4718	0.4893
Intercept	-0.01691	0.05683	0.02337
	(-0.27)	(0.69)	(0.21)
Put/call ratio	0.00675	-0.05855	-0.02997
	(0.13)	(-0.83)	(-0.26)
Value-weighted market return	-0.01954	-0.56014	-0.38174
	(-0.11)	(-2.46)	(-0.22)
Lagged value-weighted market return	0.02062	0.66821	0.83542
	(0.12)	(2.96)	(0.49)
Daily volatility	3.35345	-5.27241	-1.02961
	(0.90)	(-1.06)	(-0.21)
Evt	-0.07710	-0.04193	0.11587
	(-0.94)	(-0.39)	(-0.62)
p/cratiointer	0.08924	0.04330	-0.74935
	(1.15)	(0.42)	(0.67)
vwrinter	0.13504	-0.70594	1.13529
	(0.45)	(-1.75)	(-0.33)
laggvwrinter	0.07744	-0.43473	-7.35304
	(0.28)	(-1.18)	(0.49)
volinter	6.70870	9.90480	0.02337
	(1.42)	(1.57)	(-0.91)

Table 7: Event 2 regressions of trade volume imbalances

Panel D, E, F presents the regression results of daily aggregate number of trade imbalance, daily aggregate trade volume imbalance, and daily aggregate dollar value trade volume imbalance, respectively for event 1 on put/call ratio, risk free rate, value weighted market return, lagged value weighted market return, daily volatility, event dummy variable, the interactive terms of all the above variables with the event dummy. pcratio refers to put/call ratio, vwretx refers to the S&P500 value weighted return, daily_volatility is calculated by log(max s&p500/min), evt is the dummy variable for separating pre event and post event, and pcinter, vwinter, lagvwinter, vol inter is the related interactive terms for each vars.

	Panel D	***Panel E***	***Panel F***
	Regression1	***Regression 2***	***Regression 3***
Independent variables	***Number of trades imbalance***	***Trade volume imbalance***	***Dollar value trade volume imbalance***
Adjusted R^2	0.0126	0.1529	0.1767
Intercept	-0.02256	-0.03092	-0.08436
	(-0.24)	(-0.31)	(-0.88)
Put/call ratio	-0.00302	0.07912	0.16404
	(-0.03)	(0.79)	(1.69)
Value-weighted market return	-0.01609	-2.02894	-1.80163
	(-0.02)	(-2.03)	(-1.85)
Lagged value-weighted market return	-0.47147	1.96620	1.97726
	(-0.54)	(2.11)	(2.19)
Daily volatility	5.79707	-6.01806	-9.05983
	(0.91)	(-0.88)	(-1.37)
Evt	0.15572	-0.00280	0.03690
	(1.22)	(-0.02)	(0.28)
p/cratiointer	-0.11174	-0.05733	-0.14394
	(-0.86)	(-0.41)	(-1.07)
vwrinter	-3.10693	-0.18079	0.67276
	(-2.03)	(-0.11)	(0.42)
laggvwrinter	-1.35045	0.40792	0.27500
	(-0.94)	(0.27)	(0.18)
volinter	-5.15901	10.37130	17.08523
	(-0.55)	(1.04)	(1.76)

Table 8: Event 3 regressions of trade volume imbalances

Panel G, H, I presents the regression results of daily aggregate number of trade imbalance, daily aggregate trade volume imbalance, and daily aggregate dollar value trade volume imbalance, respectively for event 1 on put/call ratio, risk free rate, value weighted market return, lagged value weighted market return, daily volatility, event dummy variable, the interactive terms of all the above variables with the event dummy.
pcratio refers to put/call ratio, vwretx refers to the S&P500 value weighted return, daily_volatility is calculated by log(max s&p500/min), evt is the dummy variable for separating pre event and post event, and pcinter, vwinter, lagvwinter, vol inter is the related interactive terms for each vars.

Inependent variables	***Regression1 Number of trades imbalance***	***Regression 2 Trade volume imbalance***	***Regression 3 Dollar value trade volume imbalance***
Adjusted R^2	0.0961	0.0587	0.0190
Intercept	0.26977	0.00753	0.02337
	(3.38)	(0.07)	(0.21)
Put/call ratio	-0.23113	-0.00887	-0.02997
	(-2.80)	(-0.07)	(-0.26)
Value-weighted market return	-1.29249	-2.31132	-0.38174
	(-1.03)	(-1.27)	(-0.22)
Lagged value-weighted market return	-1.72832	0.26912	0.83542
	(-1.41)	(0.15)	(0.49)
Daily volatility	-6.16874	-0.84485	-1.02961
	(-1.74)	(-0.16)	(-0.21)
Evt	-0.17139	-0.02703	-0.09585
	(-1.54)	(-0.17)	(-0.62)
p/cratiointer	0.17985	0.03323	0.11587
	(1.43)	(0.18)	(0.67)
vwrinter	0.68539	-0.53529	-0.74935
	(0.42)	(-0.23)	(-0.33)
laggvwrinter	-0.05311	0.99875	1.13529
	(-0.03)	(0.41)	(0.49)
volinter	5.08861	-7.95002	-7.35304
	(0.87)	(-0.94)	(-0.91)

Table9: the aggregate three events regressions of institutional and the rest of market trade volume

The independent variable is institutional buy-sided/ sell-sided trade volume and the rest of market buy-sided/sell-sided trade volume. The dependent variable is contemporaneous market trade imbalances, lagged day one market trade volume imbalances, put/call ratio, VIX, and daily volatility proxy by natural logarithm (max (S&P500/min(S&P500)) and a serial of interactive variables.

Parameter estimates

Independent Variable	***Institutional buy-sided trade volume***	***Institutional sell-sided trade volume***	***Rest of market buy-sided trade volume***	***Rest of market sell-sided trade volume***
Adjusted R^2	0.2117	0.2350	0.2043	0.2296
Intercept	0.81585	-0.31171	0.96110	0.87945
	(-0.43)	(-1.68)	(0.83)	(0.75)
pcratio	-0.07556	1.10526	5.66095	5.73184
	(5.30)***	(6.01)***	(4.92)***	(4.97)***
VWRETX	0.62107	3.41631	14.26943***	4.90468
	(-0.10)	(3.96)***	(2.64)	(0.91)
lagged_VWR	-4.66951	-0.22143	-3.24883	-2.99819
	(0.83)	(-0.25)	(-0.58)	(-0.54)
daily_volatility	0.46307	1.26331	20.87527	29.40254
	(-0.48)	(0.11)	(0.29)	(0.41)
evt	-0.48976	0.83849***	3.35395**	3.22276
	(2.34)**	(3.55)	(2.27)	(2.18)**
pcinter	-2.04718	-0.91228***	-3.78548**	-3.59609
	(-2.27)**	(-3.54)	(-2.35)	(-2.23)**
vwrinter	-0.51557	-1.29606	-10.41055	-13.42321
	(-1.58)	(-0.84)	(-1.07)	(-1.38)
lagvwrinter	-9.19570	0.20755	-3.50161	-5.23945
	(-0.37)	(0.13)	(-0.34)	(-0.51)
volinter	0.81585	-16.04892	-102.03334	-117.53833
	(-1.17)	(-1.70) *	(-1.73) *	(-1.99)**

Table 10: Contemporaneous market return

The independent variable is contemporaneous market return proxy by S&P500 index; and the dependent variable is contemporaneous market trade imbalances, lagged day one market trade volume imbalances, put/call ratio, VIX, and daily volatility proxy by natural logarithm (max(S&P500/min(S&P500)). For the three events, event window is constructed between (-40, +40). In total, there are 81 observations for each individual event. Adjusted R^2 is provided in the last row of the table.

Independent variable: Contemporaneous market returtn	Event 1	Event 2	Event 3
Intercept	0.06341	0.00858	0.00822
	(2.94)	(0.94)	(1.19)
RMTRI	0.90162	0.29470	0.17739
	(9.17)	(8.99)	(6.48)
L1RMTRI	-0.33102	-0.03989	-0.05497
	(-3.59)	(-1.30)	(-2.04)
Pcratio	-0.04210	-0.00734	0.00211
	(-2.19)	(-1.00)	(0.29)
VIX	-0.00013282	0.00013442	-0.00036816
	(-0.51)	(0.39)	(-0.93)
Daily_volatility	-1.79009	-0.43299	-0.01548
	(-1.33)	(-0.93)	(-0.04)
Adjusted R^2	0.6524	0.5677	0.3523

Table11: event 1 Granger causality regressions

Granger causality regressions are conducted for both Institutional and market trade volume imbalances and dollar value trade volume imbalances, respectively. L1RMTRI refers to lagged day 1 market trade imbalances, L2 RMTRI refers to lagged day 2 market trade imbalances, L3 RMTRI refers to lagged day 3 market trade imbalances, L1VTRI refers to lagged day 1 institutional trade imbalances, L2VTRI refers to lagged day 2 institutional trade imbalances, L3VTRI refers to lagged day 1 institutional trade imbalances. L1RMDTRI refers to lagged day 1 market dollar value trade imbalances, L2RMDTRI refers to lagged day 2 market dollar value trade imbalances, L3RMDTRI refers to lagged day 3 market dollar value trade imbalances,L1DVTRI refers to lagged day 1 institutional dollar value trade imbalances, L2DVTRI refers to lagged day 2institutional dollar value trade imbalances, L3DVTRI refers to lagged day 3 institutional dollar value trade imbalances.

Event 1:

	Regression 1	***Regression2***		***Regression 3***	***Regression4***
Independent variable	***Institution's trade volume imbalance***	***Market's trade volume imbalance***	***Independent variable***	***Institution's dollar value trade imbalance***	***Market's dollar value trade volume imbalance***
R^2	0.2859	-0.0109	R^2	0.0656	-0.0025
Intercept	0.01362	-0.01082	***Intercept***	0.00783	-0.00152
	(1.53)	(-2.28)		(1.14)	(-0.80)
L1RMTRI	1.25163	0.12740	***L1RMDTRI***	1.10423	0.07384
	(5.53)	(1.06)		(2.63)	(0.63)
L2RMTRI	-0.25863	0.04689	***L2RMDTRI***	0.41230	0.06051
	(-0.92)	(0.31)		(0.96)	(0.50)
L3RMTRI	-0.09281	0.15272	***L3RMDTRI***	-0.65951	0.15631
	(-0.34)	(1.06)		(-1.52)	(1.29)
l1VTRI	0.34049	-0.03207	***l1DVTRI***	0.09352	0.00520
	(2.81)	(-0.50)		(0.80)	(0.16)
l2VTRI	-0.01033	0.03276	***l2DVTRI***	0.10664	0.03297
	(-0.08)	(0.49)		(0.92)	(1.02)
l3VTRI	0.06580	0.01506	***l3DVTRI***	0.00917	0.02040
	(0.64)	(0.28)		(0.08)	(0.65)

Table12: event 2 Granger causality regression

Granger causality regressions are conducted for both Institutional and market trade volume imbalances and dollar value trade volume imbalances, respectively. L1RMTRI refers to lagged day 1 market trade imbalances, L2 RMTRI refers to lagged day 2 market trade imbalances, L3 RMTRI refers to lagged day 3 market trade imbalances, L1VTRI refers to lagged day 1 institutional trade imbalances, L2VTRI refers to lagged day 2 institutional trade imbalances, L3VTRI refers to lagged day 1 institutional trade imbalances. L1RMDTRI refers to lagged day 1 market dollar value trade imbalances, L2RMDTRI refers to lagged day 2 market dollar value trade imbalances, L3RMDTRI refers to lagged day 3 market dollar value trade imbalances, L1DVTRI refers to lagged day 1 institutional dollar value trade imbalances, L2DVTRI refers to lagged day 2institutional dollar value trade imbalances, L3DVTRI refers to lagged day 3 institutional dollar value trade imbalances.

Event 2:

	Regression 1	***Regression2***		***Regression 3***	***Regression 4***
Independent variable	***Institution's trade volume imbalance***	***Market's trade volume imbalance***	***Independent variable***	***Institution's dollar value trade imbalance***	***Market's dollar value trade volume imbalance***
R^2	0.1041	-0.0688	R^2	0.0540	-0.0301
Intercept	0.01125	-0.00540	***Intercept***	0.01122	0.00363
	(1.31)	(-1.60)		(1.32)	(1.45)
L1RMTRI	0.88157	-0.00847	***L1RMDTRI***	0.86821	-0.14868
	(2.77)	(-0.07)		(2.20)	(-1.28)
L2RMTRI	0.07000	0.08153	***L2RMDTRI***	0.07856	0.02151
	(0.22)	(0.64)		(0.20)	(0.18)
L3RMTRI	-0.41268	-0.00410	***L3RMDTRI***	-0.51938	-0.08371
	(-1.27)	(-0.03)		(-1.30)	(-0.71)
l1VTRI	-0.08730	-0.00257	***l1DVTRI***	-0.01629	-0.04564
	(-0.71)	(-0.05)		(-0.14)	(-1.35)
l2DVTRI	-0.00688	-0.00072058	***l2DVTRI***	0.11697	-0.00519
	(-0.06)	(-0.01)		(1.02)	(-0.15)
l3VTRI	-0.21291	0.02208	***L3DVTRI***	-0.21607	0.00813
	(-1.86)	(0.49)		(-1.94)	(0.25)

Table12: event 3 Granger causality regression

Granger causality regressions are conducted for both Institutional and market trade volume imbalances and dollar value trade volume imbalances, respectively. L1RMTRI refers to lagged day 1 market trade imbalances, L2 RMTRI refers to lagged day 2 market trade imbalances, L3 RMTRI refers to lagged day 3 market trade imbalances, L1VTRI refers to lagged day 1 institutional trade imbalances, L2VTRI refers to lagged day 2 institutional trade imbalances, L3VTRI refers to lagged day 1 institutional trade imbalances. L1RMDTRI refers to lagged day 1 market dollar value trade imbalances, L2RMDTRI refers to lagged day 2 market dollar value trade imbalances, L3RMDTRI refers to lagged day 3 market dollar value trade imbalances, L1DVTRI refers to lagged day 1 institutional dollar value trade imbalances, L2DVTRI refers to lagged day 2institutional dollar value trade imbalances, L3DVTRI refers to lagged day 3 institutional dollar value trade imbalances.

Event 3:

Independent variable	***Regression 1 Institution's trade volume imbalance***	***Regression2 Market's trade volume imbalance***	***Independent variable***	***Regression3 Institution's dollar value trade imbalance***	***Regression 4 Market's dollar value trade volume imbalance***
R^2	-0.0296	-0.0601	R^2	-0.0040	-0.0505
Intercept	-0.02001	-0.00490	***Intercept***	-0.02477	0.00172
	(-1.95)	(-1.37)		(-2.68)	(0.49)
L1RMTRI	0.38052	0.10987	***L1RMDTRI***	0.50717	0.15227
	(1.11)	(0.92)		(1.63)	(1.29)
L2RMTRI	0.28972	0.02171	***L2RMDTRI***	0.22375	-0.02867
	(0.83)	(0.18)		(0.69)	(-0.23)
L3RMTRI	0.29659	-0.04324	***L3RMDTRI***	-0.21154	0.08360
	(0.86)	(-0.36)		(-0.66)	(0.69)
l1VTRI	0.03146	0.01242	***l1DVTRI***	0.09300	0.00702
	(0.27)	(0.30)		(0.80)	(0.16)
l2VTRI	0.06658	-0.02433	***l2DVTRI***	0.12033	-0.01529
	(0.57)	(-0.60)		(1.04)	(-0.35)
l3VTRI	0.02220	0.00224	***l3DVTRI***	-0.09216	-0.00199
	(0.19)	(0.06)		(-0.81)	(-0.05)

Table 14: Event 1 contemporaneous and lagged institutional trade imbalance & market trade imbalance:

Contemporaneous institutional trade volume imbalance (also dollar value trade volume imbalances) is conducted on the lagged market trade imbalances as well as its own lagged imbalances. Similar regressions are conducted for the contemporaneous market trade volume imbalance (also dollar value trade volume imbalances). L1RMTRI refers to lagged day 1 market trade imbalances, L2 RMTRI refers to lagged day 2 market trade imbalances, L3 RMTRI refers to lagged day 3 market trade imbalances, L1VTRI refers to lagged day 1 institutional trade imbalances, L2VTRI refers to lagged day 2 institutional trade imbalances, L3VTRI refers to lagged day 1 institutional trade imbalances. L1RMDTRI refers to lagged day 1 market dollar value trade imbalances, L2RMDTRI refers to lagged day 2 market dollar value trade imbalances, L3RMDTRI refers to lagged day 3 market dollar value trade imbalances, L1DVTRI refers to lagged day 1 institutional dollar value trade imbalances, L2DVTRI refers to lagged day 2institutional dollar value trade imbalances, L3DVTRI refers to lagged day 3 institutional dollar value trade imbalances.

Independent variable Contemporaneous Institutional trade volume imbalance	
R^2	0.3582
Intercept	0.00679
	(0.78)
RMTRI	-0.63167
	(-3.06)
L1RMTRI	1.33211
	(6.16)
L2RMTRI	-0.22901
	(-0.86)
L3RMTRI	0.00365
	(0.01)
l1VOTRI	0.32023
	(2.78)
l2VOTRI	0.01037
	(0.09)
l3VOTRI	0.07531
	(0.78)

Independent variable Contemporaneous Market's trade volume imbalance	
R^2	0.0914
Intercept	-0.00838
	(-1.84)
VOTRI	-0.17948
	(-3.06)
L1RMTRI	0.35204
	(2.59)
L2RMTRI	0.00047460
	(0.00)
L3RMTRI	0.13606
	(1.00)
l1VOTRI	0.02904
	(0.45)
l2VOTRI	0.03091
	(0.48)
l3VOTRI	0.02687
	(0.52)

Independent variable Contemporaneous Institution's dollar value trade imbalance		*Independent variable Contemporaneous Market's dollar value trade volume imbalance*	
R2			
Intercept	0.00672	**Intercept**	-0.00108
	(0.99)		(-0.57)
RMDTRI	-0.72422	**DVTRI**	-0.05617
	(-1.76)		(-1.76)
L1RMDTRI	1.15770	**L1RMDTRI**	0.13587
	(2.79)		(1.13)
L2RMDTRI	0.45612	**L2RMDTRI**	0.08367
	(1.07)		(0.70)
L3RMDTRI	-0.54631	**L3RMDTRI**	0.11927
	(-1.26)		()0.99
l1DVTRI	0.09729	**l1DVTRI**	0.01046
	(0.85)		(0.33)
l2DVTRI	0.13052	**l2DVTRI**	0.03896
	(1.13)		(1.21)
l3DVTRI	0.02395	**l3DVTRI**	0.02091
	(0.22)		(0.68)

Table 15: Event 2 contemporaneous and lagged institutional trade imbalance & market trade imbalance:

Contemporaneous institutional trade volume imbalance (also dollar value trade volume imbalances) is conducted on the lagged market trade imbalances as well as its own lagged imbalances. Similar regressions are conducted for the contemporaneous market trade volume imbalance (also dollar value trade volume imbalances). L1RMTRI refers to lagged day 1 market trade imbalances, L2 RMTRI refers to lagged day 2 market trade imbalances, L3 RMTRI refers to lagged day 3 market trade imbalances, L1VTRI refers to lagged day 1 institutional trade imbalances, L2VTRI refers to lagged day 2 institutional trade imbalances, L3VTRI refers to lagged day 1 institutional trade imbalances. L1RMDTRI refers to lagged day 1 market dollar value trade imbalances, L2RMDTRI refers to lagged day 2 market dollar value trade imbalances, L3RMDTRI refers to lagged day 3 market dollar value trade imbalances, L1DVTRI refers to lagged day 1 institutional dollar value trade imbalances, L2DVTRI refers to lagged day 2institutional dollar value trade imbalances, L3DVTRI refers to lagged day 3 institutional dollar value trade imbalances.

Independent variable Contemporaneous Institutional trade volume imbalance	
R^2	0.2227
Intercept	0.00603 (0.74)
RMTRI	-0.96676 (-3.51)
L1RMTRI	0.87337 (2.95)
L2RMTRI	0.14882 (0.49)
L3RMTRI	-0.41665 (-1.38)
l1VOTRI	-0.08978 (-0.79)
l2VOTRI	-0.00758 (-0.07)
l3VOTRI	-0.19156 (-1.80)

Independent variable Contemporaneous Market's trade volume imbalance	
R^2	0.0728
Intercept	-0.14917 (-1.17)
VOTRI	0.12303 (-3.51)
L1RMTRI	0.09198 (1.01)
L2RMTRI	-0.06566 (0.78)
L3RMTRI	-0.01559 (-0.55)
l1VOTRI	-0.00175 (-0.35)
l2VOTRI	-0.00968 (-0.04)
l3VOTRI	-0.00372 (-0.23)

Independent variable Contemporaneous Institution's dollar value trade imbalance	
R^2	0.0749
Intercept	0.01353
	(1.59)
RMDTRI	-0.63636
	(-1.64)
L1RMDTRI	0.77359
	(1.96)
L2RMDTRI	0.09225
	(0.23)
L3RMDTRI	-0.57265
	(-1.44)
l1DVTRI	-0.04533
	(-0.39)
l2DVTRI	0.11367
	(1.00)
l3DVTRI	-0.21089
	(-1.91)

Independent variable Contemporaneous Market's dollar value trade volume imbalance	
R^2	-0.0073
Intercept	0.00425
	(1.70)
DVTRI	-0.05560
	(-1.64)
L1RMDTRI	-0.10041
	(-0.84)
L2RMDTRI	0.02588
	(0.22)
L3RMDTRI	-0.11259
	(-0.95)
l1DVTRI	-0.04655
	(-1.39)
l2DVTRI	0.00132
	(0.04)
l3DVTRI	-0.00388
	(-0.12)

Table 16: Event 3 contemporaneous and lagged institutional trade imbalance & market trade imbalance:

Contemporaneous institutional trade volume imbalance (also dollar value trade volume imbalances) is conducted on the lagged market trade imbalances as well as its own lagged imbalances. Similar regressions are conducted for the contemporaneous market trade volume imbalance (also dollar value trade volume imbalances). L1RMTRI refers to lagged day 1 market trade imbalances, L2 RMTRI refers to lagged day 2 market trade imbalances, L3 RMTRI refers to lagged day 3 market trade imbalances, L1VTRI refers to lagged day 1 institutional trade imbalances, L2VTRI refers to lagged day 2 institutional trade imbalances, L3VTRI refers to lagged day 1 institutional trade imbalances. L1RMDTRI refers to lagged day 1 market dollar value trade imbalances, L2RMDTRI refers to lagged day 2 market dollar value trade imbalances, L3RMDTRI refers to lagged day 3 market dollar value trade imbalances,L1DVTRI refers to lagged day 1 institutional dollar value trade imbalances, L2DVTRI refers to lagged day 2institutional dollar value trade imbalances, L3DVTRI refers to lagged day 3 institutional dollar value trade imbalances.

Independent variable Contemporaneous Institutional trade volume imbalance	
R^2	-0.0032
Intercept	-0.02278
	(-2.22)
RMTRI	-0.56598
	(-1.71)
L1RMTRI	0.44270
	(1.30)
L2RMTRI	0.30201
	(0.88)
L3RMTRI	0.27212
	(0.80)
l1VOTRI	0.03849
	(0.33)
l2VOTRI	0.05281
	()0.46
l3VOTRI	0.02347
	(0.21)

Independent variable Contemporaneous Market's trade volume imbalance	
R^2	-0.0330
Intercept	-0.00627
	(-1.73)
VOTRI	-0.06882
	(-1.72)
L1RMTRI	0.13605
	(1.14)
L2RMTRI	0.04164
	(0.35)
L3RMTRI	-0.02283
	(-0.19)
l1VOTRI	0.01459
	(0.36)
l2VOTRI	-0.01975
	(-0.49)
l3VOTRI	0.00377
	(0.10)

Independent variable Contemporaneous Institution's dollar value trade imbalance	
R2	-0.0046
Intercept	-0.02425 (-2.62)
RMDTRI	-0.30392 (-0.98)
L1RMDTRI	0.55344 (1.76)
L2RMDTRI	0.21504 (0.67)
L3RMDTRI	-0.18613 (-0.58)
l1DVTRI	0.09514 (0.81)
l2DVTRI	0.11569 (1.00)
l3DVTRI	-0.09277 (-0.81)

Independent variable Contemporaneous Market's dollar value trade volume imbalance	
	-0.0511
Intercept	0.00064480 (0.18)
DVTRI	-0.04342 (-0.98)
L1RMDTRI	0.17429 (1.45)
L2RMDTRI	-0.01895 ()-0.15
L3RMDTRI	0.07441 (0.61)
l1DVTRI	0.01106 (0.25)
l2DVTRI	-0.01006 (-0.23)
l3DVTRI	-0.00599 (-0.14)